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LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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EDITORIAL NOTES.

A Critical Week.

In connection with the coal strike, the country found itself last week in an exceedingly critical condition; but the country has been in more critical positions, and has met them unflinchingly. This, however, was a home-bred situation of intense gravity—a situation in which men of extreme and one-sided views sought to wield the power of sectional organization to prevent what they called the "defeat" of the Miners' Federation, and the "starvation" of the miners into submission, through the action of the Government in regard to imported coal, and its distribution for public utility purposes. The action of the Government was for a much larger and more important object than the one ascribed to them by labour misleaders. The object was national in degree. There was no question whatever of the "defeat" of a section of labour, nor of the "starvation" of that particular section. The Government moved expressly that the nation—the miners, the transport workers, and the railway men included—might not be starved, and might have the vital necessaries of life. Otherwise, until the end of the week, so far as the miners' strike was concerned, there was no change in the position. The miners' leaders made no move to take a ballot of the men themselves, but relied exclusively upon the decisions of the local lodges, which are not representative of the aggregate of the miners' views. Lord Weir put forward a scheme for the adjustment of mining work and wages to the present economic state. This received a good deal of attention in the papers; but it did not help to open the way from the present issue to peace. It also transpired that the trade union movement for financial support to the miners had not come to anything much. Those who thought it would do so must have been seriously wanting in mental discernment and calculation of the probabilities.

The critical phase of the week arose over the importation of coal. A large quantity arrived in the Thames and at other ports. As was seen in the editorial article last week, the Transport Workers' Federation (with the National Union of Railwaymen) had decided that seaborne coal could be handled for domestic and public utility concerns, but not for commercial purposes. But there came the revocation of this decision in respect of imported coal, which necessitated the movement by the Government to ensure that available coal should come into the country—not for profit or commercial purposes, but to maintain those services that are essential to life. The action of the transport workers was therefore a direct attack upon the people, in order to force the Government and the coal owners into submission over the issue with the Miners' Federation. A more dastardly act could not have been conceived and put into execution. But the Government were not to be deterred from doing their duty to the nation; and the unloading of the coal from abroad and its distribution continued by the aid of volunteer labour where the ordinary transport men refused to perform the work. The Government, responsible to the nation, could not possibly recognize the right of a few leaders of a section of the labour community to have the power to say what should or what should not come into the country, though to gain the sympathy of trade unionists generally those leaders published broadcast that they were fighting the battle of the whole of labour in respect of future wages. This, of course, is undiluted nonsense. They are fighting for nothing more than the maintenance of the wages of miners at a level which the industry cannot afford to pay; and the Federation are so intent on this piece of selfishness and foolishness that they have no time or room for compunction over the fact that they are running the workers in other industries headlong into unemployment and heavy personal sacrifices of money.

However, among the public utility services are gas and electricity; and gas supplies the homes of millions of working people to-day with fuel—gas and coke—which are practically the only means they possess for cooking food. The Transport Workers' Federation have been trying to get the unions associated with the gas and electricity industries to persuade their men not to handle coal that comes from abroad to maintain these necessaries of life to-day. But we hesitate to think that there are, at any rate, gas workers who would adopt a policy that would inflict such widespread misery, promote no good to themselves, or affect the issues of the strike in any way. For bringing the strike to an end as speedily as possible, there is reason enough in the damage it is inflicting upon the industrial and commercial position of the country, as well as upon the National Exchequer, without attempting to intensify the trouble. We see that the Executive Committee of the General Workers' Union met last Thursday, to discuss the situation; and at the close Mr. Will Thorne, M.P., announced that the Executive had decided to support the transport workers' policy, but that each case must be dealt with in accordance with the circumstances of the district. However, neither gas nor electrical undertakings are likely to get any more British coal until the pits are restarted; and so they have now to make their own arrangements through agents to secure imported coal. In the case of electricity stations, some important ones in London and the Provinces are mitigating their dependence on coal by converting their boilers to oil-firing. Coke is again a commodity which does not go begging for custom; and those gas undertakings which do their own tar-distilling ought to be finding a good market to-day for their fuel oil among those steam users who are already patrons of coke for steam-raising. When oil is used with coke, it is only necessary to direct the blast of the oil-burner through a hole in the front of the fire-box or door on to the solid fuel; no special baffle being required, as when the oil is used alone, for the flame to impinge upon.

Friday was the critical day when the railwaymen were to settle their policy in regard to the transport of imported coal. But the day before, the Executive of the Associated Society of Locomotive Engineers and Firemen sought to be first in the field, and apparently desired to precipitate matters, by ordering their members not to touch coal from abroad, and threatened that any discharge of men in consequence would be followed by a general strike. This was a serious condition of things; and people were wondering on Friday morning what would be the decision of the Executive of the National Union of Railwaymen. They hesitated to believe that there would be a majority on that body who would abandon their duties and responsibilities as citizens, notwithstanding the gathering signs of greater activity among the extremists. The event proved that the dictation of the latter had succeeded. There were two courses open to the Executive—to save from distress millions of people of the country by not attempting to deprive them of what is an elementary necessary to life through its use in public utility concerns, or to become the tools of those fanatics who have rejected the decent offer of wages shown in our news columns to-day. The Executive of the railwaymen adopted the disgraceful course of putting unreasonable trade union policy above humane considerations, by deciding to instruct their members not to handle imported coal, nor coal of any description if handled by "blackleg" labour. This

was putting the cap upon the decision of the Transport Workers' Federation. A more pitiable exercise of power there could not have been. Moreover, in a joint conference, both bodies reaffirmed their decision to tighten the embargo on foreign coal, and called upon Dutch and French transport workers to honour the resolution of the Geneva Congress imposing a blockade on coal for England. Nevertheless, to-day the British public is still taking the position with quiet, characteristic indifference; but the views of the public upon the action of the railwaymen's and transport workers' organizations are of a supremely scornful order. On Friday, too, the Northumberland Mine Workers' Federation Board, while agreeing to the removal of coal essential for poor people and miners, resolved that there was to be no removal of coal for gas undertakings. But the Government are prepared for these revolutionary tactics, which there is every confidence have not the sympathy of the majority of the working people of the country. The callousness of the whole of these proceedings is bound to have an effect which will react adversely upon the trade-union movement in the country, and upon the hare-brained men who are governing the proceedings of the larger unions in these critical times, when the work that gives employment to labour is fast diminishing in volume here, and is being transferred to other countries, to their enrichment and our impoverishment. In the killing and exporting of work the Miners' Federation, the Transport Workers' Federation, and the Railway Men's Unions have taken prominent part. The day of reckoning will come; and then the eyes of the workers will be fully opened as to the deplorable pass into which they have been led by the policy that has been allowed to prevail.

However, the Miners' Federation do not think much of the new movement of the Transport Workers and Railwaymen's Unions. The Secretary of the Miners' Federation (Mr. Frank Hodges) describes it as a "splendid gesture of "sympathy," but one that comes too late. Now there are expectations that there will be a resumption this week of the conferences between the coal owners and the miners' representatives. There is a growth of the desire among the men themselves for returning to work on the coal owners' terms; but the publicity department of the Miners' Federation continue to promulgate the intelligence of a solidarity among the men and a determination to stand-out for the fulfilment of the claims upon which the strike started. There are two voices; and they do not agree—universally. Each has application taking district by district. And in all of them, there is a sensible and enlarging detachment from the principle of a national pool.

Fuel Economy.

The question of fuel economy is becoming more insistent, and the insistence takes the monetary form. When fuel was much cheaper, its waste went on without a great deal of care or thought for posterity. "Posterity must take care "of itself" was the view expressed by heedlessness and inaction in the cause of fuel economy. But now producing costs have gone up vigorously; and they show a strong inclination to remain at a high level. Manufacturers are therefore being urged by self-interest to find the means whereby they can reduce cost by securing economies, and fuel is a source in which there has been waste, and therefore it is a source of economy. But not all manufacturers appear to be alive to this, though the number who are is, we believe, greater than is generally thought. The Fuel Economy Committee which the Federation of British Industries set up some eighteen or more months ago, have apparently come to this conclusion as a result of a questionnaire that they sent out some time since. The number of firms who answered was disappointing; and the Committee take this as proof that much educational work requires to be done before it can be said that British industry is fully alive to the fuel factor in successful production. That is rather a sweeping suggestion. It may be true; but we are inclined to think it may be to an extent discounted—at any rate, to-day. The replies received by the Committee only represent about one-third of the industrial fuel requirements of the country; and no doubt those who replied to the questions are those who rather pride themselves on the efficient use they make of fuel. A large proportion of the rest may be manufacturers who are waiting for a more convenient season for replacing their fuel-consuming plant with more economical types and methods. The process of change in such a matter must be gradual, as we know well from what happens in the gas industry. However, it seems to us that fuel economy is a national question, and that it should therefore be taken up by a Government Department, rather than by an organization that—though industry in varied form is largely represented in its composition—has no power to command information. The Board of Fuel Research are investigating fuel problems; and what they are doing will show the lines to greater economy, and will supply the argument for the eradicating of the defects of present practices. One thing that is certain is that works, large and small, will in future have to exercise greater scientific control over fuel use, and instruct their employees in up-to-date firing and heat utilization practices.

But from general observation our view is that the open and the hidden heat losses of industry, which in the aggregate represent a considerable waste of fuel, are receiving greater attention than formerly from the technical men of the various industries. We are not among those who expect rapid conversion or revolution in this regard. There is already a growth from the seed that has been sown; and as the good results receive propagation, fuel economy will spread in all directions. Let us take one or two examples. There has of late been a good deal of attention paid to the question of thermal losses on gas-works; and there has been quite a stir in interest recently to ascertain where and how savings can be effected. The waste-heat boiler is now doing good service in connection with water-gas plants and vertical retort-settings, and experimentally it has been tried with horizontal settings. There exists a belief in some quarters that gas-works can from waste heat discard entirely boiler houses and plant and all they mean in the way of expense, and practically automatically generate all the steam required. Spent charges from retorts are, in their incandescent state, being transferred at Brentford into water-gas generators; and at Harrogate in his mixed-gas plant, Mr. Robinson is passing incandescent coke from horizontal retorts direct into small water-gas generators, utilizing the blow gases for heating the retorts, and passing the high-temperature water gas through the coal. All this contributes to fuel economy. Then by means of air-regulators, the draught of the chimneys on the furnaces of retort-settings is being controlled; and fuel waste is being reduced by this means, as also by the CO_2 test of the chimney gases. But such control, except in the larger works, is more a rarity than a common practice. We are afraid it is often overlooked by some gas engineers that a difference of 10 or 20 p.ct. in the efficiency of their retort-heating operations means a 10 or 20 p.ct. gain or loss (as the case may be) in their fuel account. However, in these and other ways, gas engineers are devoting themselves to realizing higher heat efficiencies in their processes. And fuel of any sort that can be saved to-day—seeing that the old standards of fuel values have departed—is something of greater importance than it was before the war. Another route to fuel economy in the gas industry is found in the appliances by which gas and coke are consumed—especially gas. There is room for higher efficiency in most gas-using appliances, though there is a goodly proportion of waste that can be attributed to the carelessness of the users. This will apply to both domestic and industrial appliances.

For another illustration of the attention that is being given to fuel economy, we may turn to the recent proceedings at the annual meeting of the Iron and Steel Institute. The discussion on a paper by Mr. S. H. Fowles showed that the members generally are taking more interest than ever in the matter of both fuel and power economy, but that there is a division of opinion on various points which it should not be difficult to clear up. The principal feature of the paper was a presentment of accomplished facts, demonstrating that, if there was efficient cleaning of blast-furnace gases, great economy in both heat and power could be achieved by them. When we come to think that it is possible to-day, if the waste gases from the blast-furnaces of the country were well cleaned, to produce something in the neighbourhood of 3 to 4 million horse power from them, in addition to reducing large coal bills, speeding-up works, and undertaking much of the duty done by the coal-fired boiler, then it is seen that there is something substantial for which to work. Then steam engines and turbines could be superseded by gas-engines; and electricity generation could, where required, be largely developed. This has all been proved at Palmer's Shipbuilding and Iron Company's works. The plant for cleaning the blast-furnace gases there has effected a great

saving of coke and coal. The calculation is about £520 per week; and the power supply for the whole works, which was previously by means of 88,000 KW.-hours per day, costing a little over 1d. per unit, is now produced entirely from waste gases at about 20 p.ct. of the unit cost—due entirely to the proper cleaning of the blast-furnace gases, which enables gas-engines to be used. This shows that thorough cleansing of the blast-furnace gases pays. On the works boilers have entirely disappeared for power purposes. Why should not solid-fuel heated boilers also disappear from many gas-works? There is a probability that they will as time passes; but it would be interesting to have, as early as possible, more efficiency data and relative over-all costs from ordinary boiler plant and waste-heat boilers.

One point upon which there is division of opinion is as to which is the better, to use low-grade gas direct in gas-engines or for firing boilers. Mr. Fowles, as already remarked, prefers to use waste gas in gas-engines. In his paper, it is seen that 636,000 c.ft. of blast-furnace gas were formerly used per hour for boiler-firing to raise steam for power purposes; the total load being only about 1200-H.P. Now 636,000 c.ft. × 100 B.Th.U. per c.ft. = 63,600,000 B.Th.U. per hour; and this should develop 6500-H.P., as against 1200-H.P. with the gas used under the steam-boiler. Another authority gives 9000 B.Th.U. per B.H.P.-hour, which would yield a better power return (7000-H.P.) than that of Mr. Fowles—*i.e.*, with large gas-engines. Anyway, the 6500-H.P. shows a margin of safety. However, Mr. Fowles submits that his figures show that the use of gas under boilers is only about 20 p.ct. as efficient as the large gas-engine. On the other hand, gas can be employed very efficiently for boiler-firing. Some time ago the Yorkshire Electric Power Company were getting 80·2 p.ct. efficiency from boilers fired with coke-oven gas; and frequently figures of upwards of 90 p.ct. have been shown with the Bonecourt boiler.

All these are points which constitute evidence as to the growing interest in fuel economy, and of the adoption of practices that are largely improving the heat efficiency of industrial establishments—including gas-works.

Continuous Pressure Records at Headquarters.

BETTER control and higher efficiency in all manufacturing processes are of the tenets that have of late received greater adoption in the gas industry; and there are workers in every field seeking for greater improvement and simplification in order to achieve the desired ends. But there is one part of the work of the industry in which all that is desirable has not been accomplished, or, if accomplished, has not received application. That is in regard to effective control in the distribution system. The time has, however, come when consideration should be given, in the work of distribution, to the application of greater automatic surveillance, with a constant transmission of the results to headquarters where the records will supply instant and continuous information as to what is happening in all parts of the area of supply. In such knowledge lies the assurance of higher distribution efficiency. In respect of calorific power and of volumes of gas passing at any given point, invention has come from America, to which the name of "Thomas" is attached, which enables graphic records to be produced in the engineer's office, and so show him synchronously and precisely what is occurring at a distance away. Whether there will be developments in these directions has yet to be revealed. But in regard to calorific power, the consumer at the extremity of the supply area will have to receive gas of a calorific value equal to the declared, or there will be unpleasantness for the suppliers. Of course, a fair amount of confidence is realizable in this respect by experimental calorimetric work at the manufacturing station and at the extremes of an area of supply to ascertain what margin of thermal safety must be allowed in the gas in order that the declared value reaches the confines of the district.

A matter, however, of more vital importance, because subject to vagarious and uncontrollable conditions, is that of pressure. In the future, according to the new enactment, there is to be a minimum pressure of 2 in., in all parts of an area; and the Board of Trade may prescribe different minima for different parts of a district, and for different calorific powers. But whatever pressure is prescribed, the Order will have to be complied with. Then, again, demands upon distribution systems vary largely; and with domestic heating becoming so prevalent, and likely to become more so, fluctuations in the drafts upon the distributing mains will become more and more inconstant in both time and degree. And if there is a high-pressure feeding system, the time to boost is when the extra demand is being made. Hitherto, however, pressure information has come through to headquarters in rather a crude, intermittent fashion. The information conveyed by locally placed pressure-recorders has only been available in some cases twenty-four hours afterwards. Up to a point, this may be useful; but it may be the record of a condition of things that is infrequently happening, and yet, had the intelligence been available at the works earlier, a heavy drop in pressure and a great rise in dissatisfaction might have been avoided in many instances.

But it has to be admitted that the continuous automatic transmission of pressures to the works from each district in an area of supply has not hitherto had the investigation and the inventive faculties bestowed upon it that its importance deserves. The neglect of the matter has now been removed. One worker—Mr. H. C. Widlake, of the Plymouth and Stonehouse Gas Company—has been devoting himself to the problem, and has found it a long and disappointing matter to evolve an instrument which could safely be entrusted with the duty of registering pressures at a distance, and transmitting the results to the gas-works. But patience and perseverance have realized success, and practicability has been demonstrated by one of the instruments working, without hitch or interruption, in connection with the Mutley district of the Company since July last year. The length of the trial is convincing as to success. Continuously in the works there has been information as to what has been happening in regard to pressures in that district. Every representative part of an area of supply could therefore be similarly dealt with, and the contemporary pressure conditions all over the area be always before the responsible official in one place. This is an important matter. There is originality here. If other experience confirms anticipations and the results of the Mutley trial, and there are no disabilities in respect of application, this pressure-information transmitting invention should receive a hearty welcome. The invention should also be useful for continuously recording pressure conditions on the works. We will not refer to its details here. They are explicitly set forth in an illustrated article in later columns, and to it this allusion will cause readers to turn.

Gas Stock Market Quotations.

THE holders of gas shares and stocks are becoming more heartened—thanks to the Gas Regulation Act and the revising work of the Board of Trade under it in respect of standard and maximum charges, translated to the therm basis. Notifications are being made as to the probable dividends that will be paid on the next occasion, if profits will allow under the disturbed conditions of the present. The result of this is that more inquiries are being made for gas stock and shares at present market prices; but inquirers are faced with the fact that present holders are not disposed to lose the increase of dividend, and sacrifice their holdings at current market values. Those in possession of the stocks and shares are wise. Those who are fortunate enough to buy at the prices ruling at the beginning of last week and previously, would be getting, under the revised terms, anything between 8 and 10 p.ct. (perhaps more in some cases) upon their investment, while, of course, the holders who bought their stock or shares at pre-war prices will only be receiving, approximately, their pre-war dividends. However, the end of the fall of market values has arrived, and prices are on the ascent. As yet, they have not done much towards helping to fill the enormous gap between pre-war values and current values; but still a start has been made on the road of recovery. That is something to the good, and is an agreeable change. If there was not the present disturbance in conditions, the movement would undoubtedly have been more rapid. Given the actual payment of higher dividends, cheaper coals, and more settled conditions, there should be quite a respectable recouping of market values. The advent of more would-be buyers shows there exists a good appreciation of the value that there is in gas stocks. We congratulate those buyers who have got hold of stocks and shares at recent and present prices. We congratulate still more those owners who refuse to part with their holdings at current quoted prices, knowing that they are totally unrepresentative of intrinsic value.

The Postponed Institution Meeting.

The week has fully justified the Emergency Committee of the Council of the Institution of Gas Engineers in their decision to postpone the annual meeting. Nothing has yet been decided as to when the meeting will now be held. It will, we should think, be better to leave a final decision of the matter until industrial affairs are in a composed state; and then there will be the holiday season to keep in mind. In view of this, the autumn would appear to be the most promising time for securing a large attendance. However, we shall hear more about this when the President (Mr. Thomas Goulden) has had an opportunity of having a meeting with his Council.

Visit of the Société Technique.

From Mr. Walter T. Dunn, the Secretary of the Institution, we hear that he has received a message from the Secretary of the Société Technique du Gaz en France, to the effect that the Committee have decided to postpone the visit of the members to England; and from a Paris communication, it is learned that M. Kaeuffer, the President of the Société, will be writing to our President on the subject. The Council of the Institution left the matter entirely in the hands of their French compeers to deal with and act upon in the manner that appeared to them best in the circumstances. We hear that our old friend, Mr. R. S. Gardiner (who has been a member of the Société for some forty years) has been in Paris; and so has been able to fully explain to the Council of the Société the position of affairs in this country due to the coal strike and to industrial unrest generally. This no doubt greatly assisted the Council to determine to defer the visit until a more propitious occasion. We regret very deeply the necessity for doing this; but we know how much our French colleagues appreciate the situation, and how fully their sympathy is with their British confrères in this period of heavy anxiety.

Coke and Industry.

In the Metropolitan area, coke for industrial use can be obtained only by permit granted by the local authority. Permits can be issued to essential industries up to 5 tons per week; but allowances for anything in excess of this must receive the consent of the Metropolitan Emergency Coal Committee. Permits are not required for coke for domestic use. This restriction in respect of industrial coke shows how greatly the strike has affected the fuel reserves.

Steam-Oxygen Gas-Making Process.

It will be seen from an article in later columns that negotiations are pending in America for the construction of an oxygen-steam plant of 20 million c.ft. capacity per day for use by one of the large Pittsburgh steel companies. In the industrial field of America, this capacity is only a moderate one. The information is conveyed in a letter received from Mr. E. A. W. Jefferies, of Worcester, Mass., whose masterly study of the application of oxygen to gas making has been quite recently the subject of notice in the "Journal." A plant of 20 million c.ft. capacity per day would be a demonstration of practicability that would be of immense importance; and so we hope the negotiations will have a favourable issue.

Prof. Bone's Plain Facts.

We cannot imagine a surgical operation or anything else preventing Prof. Bone taking an interest in current affairs relating to fuel problems. It is gratifying to see that he has so far recovered from a serious operation that he has addressed a letter to the "Daily Telegraph," which shows that this country's industries cannot live on coal at recent prices, nor on those that would be necessitated by the terms offered to the miners by the coal owners. The maintenance and prosperity of our great manufacturing industries require coal at 20s. per ton. Whatever the requirements, personally we are not very hopeful of realization. However, that is the conclusion to which Prof. Bone's recital of clear facts leads. It is not a question of heavily reducing the weekly earning power of the miners. What is wanted is that they shall give more production for their wages, so that the producing costs per ton may be reduced. The only alternative to cheap coal is industrial collapse, says Prof. Bone; and that is the plain truth of the matter. The heat and fuel amateurs have been busy again. There has been much foolish talk in the papers, and (this is not strange) some in the House of Commons, during the past few days as to what is being done by the conversion of coal-fired boilers to oil-firing. Largely, this can only be a temporary expedient in an emergency; the change can only be permanent partially in industry, and whether it is so will depend on the relative costs of the effective B.Th.U. of the fuels. As Prof. Bone points out, the amount of fuel oil available would not suffice for a tithe of our industrial requirements.

Safeguarding Industries.

The House of Commons debated very seriously last week, for many hours, and sometimes with a good display of vehemence on the part of certain speakers, the resolutions which are fundamental to the proposed Safeguarding of Industries Bill, which some people want, and a good many do not. One of the resolutions dealt with key industries, and the other with dumping. The tariff reformers and the free traders came up armed cap-à-pie for the fray. But the latter had a very bad time. All their assaults proved unavailing. Their amendments fell one after the other; and the resolutions were confirmed. The method of safeguarding both classes of threatened industries is the same. There is to be a Customs duty of 33⅓ p.ct. of the value of the article. But the periods during which the duties are to be levied will be varied—for key industries, five years; for industries threatened by dumping, three years; and by industries threatened by other forms of dumping, no limit. To keep in touch with key industries, there is to be set up a Committee who will report annually to Parliament the progress that is being made. Then at the end of five years, the Government will be able to review the situation, and act as is considered best. An opportunity should, in our opinion, be given to users to make representations as to any shortage of supplies and profiteering at home, so that there might be revision before the expiration of five or three years as the case may be. A Committee will also be set-up to deal with dumping; and each case of alleged dumping will have to be proved to their satisfaction before the duty is put on. Of course, duties on articles of food and drink are excluded; but there is no intention of putting duties on raw materials. Laboratory and optical glass, lamp ware, scientific instruments, thorium, and cerium (basics in the gas-mantle trade), and other raw materials are found among the rest of the things earmarked for protection.

Railway Grouping and Economy.

The Minister of Transport (Sir Eric Geddes) introduced into the House of Commons on Thursday afternoon the new Railway Bill, which is said to be absolutely necessary to meet the changes that must ensue when railway control lapses in August next. It is equally apparent that these changes should follow the lines of greater efficiency in service, large economy in management, and gradual extension of the public facilities that have been reduced by abnormal conditions. It has been decided, in the first instance, that the proper line of progress lies through the establishment of larger and better operating units. In order to abolish as far as possible competitive services for the same traffic, and a system of competition that exhausts competing railway lines without ultimate advantage to those they serve, it has been decided to bring about a wide measure of co-operation by reorganizing the railways of Great Britain into six groups. The Bill proposes to leave companies in the six groups to arrange their own amalgamation scheme; but if they cannot agree between themselves, a Railway Amalgamation tribunal will be instituted to take the responsibilities they are unwilling or unable to assume.

A Railway Rates Tribunal.

Among other things a new rates tribunal is to be set up; and it is in this that the bulk of our readers will be concerned. Hitherto the principle on which rates have been regulated has been the establishment of maxima by statute. This has left the actual rates within the maxima to the discretion of the companies—subject, of course, to the Act of 1894. But obviously it would be unreasonable to maintain this condition after the amalgamations outlined by the Bill came into force. The Railway and Canal Commissioners will continue to act as arbitrators for the Ministry of Transport or the Board of Trade. The new rates tribunal will decide the incidence of ratings; and will seek in general terms to impose upon each class of merchandise a fair

share of the burden that Railway Companies must carry. The basis on which rates are to be fixed will be one designed to secure for each company a standard revenue, based upon that obtained in 1913, together with 5 p.ct. upon capital expenditure made under Government control, and a further allowance in respect of large capital expenditure not fully remunerative in 1913. It is obvious that rates established in the immediate future will be upon the basis of existing conditions which cannot be regarded as stable. Consequently, these rates must be modified as conditions change. To this end, they will be reviewed annually for three years, and thereafter at stated periods in the Minister's discretion. It is felt that a standard revenue that should be invariable would go far to destroy that initiative in Railway Companies on which both the general prosperity of the Company and the country must depend. Where the rates yield a return in excess of the standard, 80 p.ct. of the excess will go in rate reduction, and 20 p.ct. to the revenue of the Company earning it. We noticed last week [p. 312] the proposals included in the Bill in regard to the future position of the workers in relation to the management of the railways.

PERSONAL.

Mr. W. J. IMBRIE, of Banbury, late Argyll and Sutherland Highlanders, has been appointed Engineer and Manager of the Yeovil Corporation Gas Department.

Mr. COLLINS, of the Nelson Corporation Gas Department, has been selected as Deputy Chief Clerk to the Portsea Island Gas Light Company.

The resignation (already announced in the "JOURNAL") by Mr. JOSEPH B. WILLIAMSON, J.P., for reasons of health, of the position of Chairman of the Tynemouth Gas Company has been received with the utmost regret by his co-Directors and the officials and workpeople; and the severance from an undertaking in which he took the greatest interest will be keenly felt all round. He leaves the chair after having occupied it with conspicuous ability and success for some 25 years. He was first appointed a Director in 1887, and eight years later, in 1895, was elected Chairman; so that he has been a member of the Board for 33 years. During the past 20 years he has only been absent from 7 out of a total of 375 Board meetings, an attendance equal to 98 p.ct., besides which he was a regular attendant at the usual weekly meetings at the works. Since the commencement of his period of office as Chairman, the yearly output of gas has increased by about 173 p.ct.—in other words, the Company has considerably more than doubled while under his chairmanship. In the year 1895, the quantity of coal carbonized amounted to 25,800 tons, and the make of gas to about 256 million c.ft.; whereas during the past year over 55,000 tons of coals were carbonized, and about 698 million c.ft. of gas made in the works. Being a gentleman of high technical attainments, his knowledge of the Company's business—especially in regard to the manufacturing processes—has been of considerable value and help to his engineers; and during his chairmanship the works have been considerably extended—one complete new unit having been built, and another unit reconstructed. Mr. THOMAS YOUNG succeeds Mr. Williamson as Chairman of the Company.

OBITUARY.

After a lingering illness, Mr. HERBERT STANLEY PIKE died at his residence, The Knoll, Moss Lane, Pinner, on Sunday, the 1st inst. Mr. Pike was Engineer and Manager for some twenty years of the Colchester Gas Company, from which position he retired in 1913, following upon a serious breakdown in health.

The death is announced, at the age of 56, of Mr. EDMUND F. VESEY KNOX, K.C., who was well known to "JOURNAL" readers in connection with his extensive practice at the Parliamentary Bar, from which he retired in February, owing to ill-health. In 1890 he was elected as a Nationalist member of Parliament for Cavan, and afterwards sat for Londonderry City, but retired in 1899, and thereafter devoted his energies to the Bar. Death took place at his family residence in Newcastle (co. Down).

Mr. John Miles, J.P., who was a Director of the Gas Light and Coke Company and the Southgate and District Gas Company, and who died last March, at the age of 85 years, has left property of the value of £71,763.

National Association of Technical Gas Officials.—An Executive Committee Meeting was held in Birmingham on Saturday, May 7. The business was largely in preparation for the annual general meeting. The financial statement for the year was considered, and will be in the hands of members, together with a full draft of the suggested alterations to the rules, in a few days. A report was received of the reply to the Association's approach to the Federation of Gas Employers; and it was considered satisfactory.

NATIONAL GAS COUNCIL.

Meeting of the Central Executive Board.

A MEETING of the Central Executive Board of the National Gas Council was held on Tuesday of last week, the 10th inst., at No. 30, Grosvenor Gardens, S.W.—Mr. D. MILNE WATSON in the chair. The following matters were considered.

COAL POSITION.

A meeting of the Emergency Committee of the Council on the 27th of April was reported, to discuss the coal position in view of the miners' strike.

It was reported that the Council had been in communication with a very large number of gas undertakings, and in many instances (after consultation with the Mines Department and coal factors) had succeeded in obtaining supplies of coal for them. Where it has proved impossible to obtain coal, undertakings have been advised by the Council to communicate with their District Secretaries.

A resolution from the Eastern District Executive Board, suggesting that the Council should draft a special form of contract for the purchase of coal, was reported. After consideration this was not considered possible in view of the fact that conditions varied all over the country. Undertakings were advised, however, to insist on a "Fall" clause in any coal contracts they entered into. The suggestion was made that, where possible, it was advisable to contract ahead for tonnage, and to agree a price from month to month.

A list was read of the reductions in pressure made by certain undertakings at given periods of the day and night, and the economy in gas consumption effected thereby.

DRAFT CLAUSES, RE OVERDRIVING OF METERS, &c.—The Council's Parliamentary Agent (Mr. C. E. C. Browne) was present to explain the position with regard to the draft clauses submitted by the Institution of Gas Engineers for insertion in the Private Acts of gas undertakings or in Special Orders under section 10 of the Gas Regulation Act, with regard to the overdriving of meters. After a very full discussion, Mr. Browne said that he would redraft the clauses and obtain counsel's opinion, if necessary, upon the powers of gas undertakings in this respect under the Gas-Works' Clauses Act, 1871, and in particular, under sections 17 and 19.

SUPPLY OF ELECTRICITY IN BULK.—It was decided that the Council should oppose the action of the Electricity Commissioners in authorizing the supply of electricity by a non-trading Government Department in the district of a statutory gas undertaking.

WORKMEN'S COMPENSATION INSURANCE.—Negotiations with various insurance brokers were reported, with a view to obtaining the lowest possible rate for gas undertakings for liability under the above Act. The figures quoted the Council are so low that the proposition of a collective scheme would appear to be worthy of the serious consideration of the gas industry. The rate will largely depend upon the number of gas undertakings entering the scheme. The Council proposes to issue a further questionnaire on this matter.

SULPHURIC ACID.—A deputation from the Council, consisting of Mr. Thomas Glover, Mr. Stanley Jones, and Mr. W. A. Walmsley, met the Costing Committee of the National Sulphuric Acid Association on the 14th of April, to urge a further reduction in the price of sulphuric acid. It was pointed out that various makers in the Provinces were declining to reduce the price of acid as recommended by the National Sulphuric Acid Association in London. Cases were cited before the Costing Committee where difficulty was being experienced in this direction. It was pointed out by the Association that acid makers in South Wales and the West of England had not been able to agree to the last reduction in price, owing to the fact that their plants were working at only 20 p.ct. of their normal producing power.

CONTRACT PRICES.—A resolution was read, requesting the Central Executive Board to consider the advisability of drawing-up a properly framed standard clause to be inserted in all contracts made providing for reductions in the cost of work in view of any decreases in the cost of materials and labour. It was stated that this matter was already under consideration, and that anything that transpired would be immediately circulated.

INCOMBUSTIBLE CONSTITUENTS.—Further evidence before the Gas Incombustibles Committee appointed by the Board of Trade was reported, as follows: On April 18, Mr. A. E. Broadberry (Tottenham), and Mr. T. F. E. Rhead (Birmingham). April 19, Mr. Thomas Goulden. April 27, Sir Dugald Clerk.

Institution of Civil Engineers Council.—The result of the election of office-bearers for the year 1921-22 was declared at the annual meeting on the 26th ult. of the Institution of Civil Engineers; the President being Mr. W. B. Worthington. The members of the Council, who will take office on the first Tuesday in November next, include Dr. Charles Carpenter, C.B.E., Sir Robert A. Hadfield, Bart., D.Sc., D.Met., F.R.S., Mr. Kenneth P. Hawksley, Captain H. Riall Sankey, C.B., C.B.E., R.E. (ret.), and Sir John F. C. Snell.

THE STEAM-OXYGEN GAS-MAKING PROCESS.

Further Information from America—Negotiating for a Start in the Industrial Field.

In our issue for March 30, there was printed an instructive paper by Mr. E. A. W. Jefferies, of Worcester, Mass., on gas making with cheap oxygen; and in the succeeding number, additional notes by the same author were published on the relative efficiency of gases in high-temperature heating, with some editorial comments on both studies. An interesting letter and diagrams have since been received from Mr. Jefferies. In the course of the former, referring to the editorial article, he says: "The only comment I can now make is to express a renewed determination to push forward a demonstration in this new field with all possible dispatch. The preliminaries are well under way [see the final paragraph of this article]; but we are not entirely free from Government control in the matter of helium production, for which we were commandeered during the war. Our efforts have been entirely successful in this work, which gives us certainty of data with regard to the cost of oxygen."

Attention is called by Mr. Jefferies to the diagram which we published on p. 807 of the "Journal" for March 30, showing variations in the cost of raw gas with the cost of coal. As he points out, the formula under the diagram is unintelligible because the constant was omitted; and the diagram itself also has no meaning without a statement as to the gas-making capacity which it represents. Mr. Jefferies acknowledges that these omissions are not our fault. The revised diagram which he sends shows that the words "Based on producing 10 million c.ft. per day" should have appeared under the heading; and the formula below should read—

$$\text{Cost in cents per 1000 c.ft. gas} = \frac{\text{Price of coal in cents per gr. ton} \times 1{\cdot}047}{69} + 4{\cdot}76$$

The following explanatory words succeed:

> The heat required by oxygen plant per 1000 c.ft. of oxygen will not exceed 85,000 B.Th.U. If we burn our own gas for this purpose at 90 p.ct. efficiency, we should use 85,000 ÷ (400 × 0·9) = 236 c.ft. of gas per 1000 c.ft. of oxygen—that is, per 5000 c.ft. of gas made in the producer = 4·7 p.ct. Oxygen plant capacity, 3 million cubic feet per day.

The second diagram that was enclosed with the letter shows the cost of raw gas made by the oxygen-steam process with varying plant capacities and varying price of coal. The costs of coal are expressed in dollars per gross ton ranging from $1 to $14, and the cost of gas in cents per 1000 c.ft. Taking the cost of coal at $3 with a gas plant capacity of 1 million cubic feet per day, the cost per 1000 c.ft. of raw gas would be 19 c.; with a plant capacity of 2 million, about 15 c. per 1000 c.ft.; with a plant capacity of 5 millions, about 11 c. per 1000 c.ft.; with a plant capacity of 10 millions, about 9·25 c. per 1000 c.ft.; with a plant capacity of 20 millions, about 8·2 c. With coal at $10, with a plant capacity of 1 million cubic feet per day, the cost would be about 29 c. per 1000 c.ft.; with a plant capacity of 2 million cubic feet, about 25·8 c. per 1000 c.ft.; with a plant capacity of 5 millions, about 22 c. per 1000 c.ft.; with a plant capacity of 10 millions, about 20 c. per 1000 c.ft.; and with a plant capacity of 20 millions, about 18·8 c. per 1000 c.ft. The diagram from which these figures are taken represents about three years' work; and the information it gives is comprehensive of coal costs at dollar steps between the two extremes already mentioned, and of costs of gas in cents per 1000 c.ft. for plants of 1, 1½, 2, 2½, 3½, 5, 7½, 10, and 20 million cubic feet per day. The figures as to costs quoted above are purely illustrative of the large amount of information in the diagram. Two other diagrams sent give the cost of oxygen per 1000 c.ft. (figured by two sets of data), and the cost of oxygen per million cubic feet of raw gas per day.

A point as to the cost of coal in America. Mr. Jefferies knows the cost of coal in this country; also that we are struggling with the condition in which we stand with a miners' strike that has lasted six weeks. He tells us something which is informative, but which in respect of coal prices does not console. He writes: "I notice you sigh for gas coal at $4·5 per ton; this being the basis upon which my calculations have been made. It might interest you to know that in Pittsburgh last week I was offered unlimited supplies of the best gas coal delivered at $3 per ton. [The letter is dated April 21.] This offer was made in connection with negotiations going on for the building of an oxygen-steam gas plant of 20 million c.ft. capacity per day for use by one of the large Pittsburgh steel companies. This capacity is only a moderate one in the industrial field here, where users have been accustomed to natural gas. It now looks very much as if the new process would be demonstrated first by large industrial users rather than by the municipal services." This is interesting information, because, if the negotiations are successful, it will be the pioneer oxygen-steam gas plant on a large working scale.

Use of Acetylene on Ships.—It has been intimated by the Marine Department of the Board of Trade that surveyors need not raise any objection to the use of acetylene for the lighting of closed spaces on board fishing and other vessels, provided that conditions which they lay down are fairly met. The first of these is that the generator should comply with the regulations as to acetylene generators issued by the British Acetylene Association.

ELECTRICITY SUPPLY MEMORANDA.

Passing events sometimes cause additional interest in casting the mind back. From the standpoint of to-day, we should like politicians to reflect upon the days prior to the entering on the Statute Book of the Electricity Supply Act of 1919, when the Premier, misguided by electrical reports, spoke of the bountiful blessings that would issue from a reorganization of electricity generation in this country, when Mr. Winston Churchill spoke with his normal buoyancy of rivers of "juice" flowing through the country, and when these and other political stars prophesied that the reformation of the generating and transmission sides of electricity supply would regenerate industry generally throughout the country. The while manufacturers stood looking on and listening unmoved, though more or less amused. They knew better than the politicians that it was not electric power that British industry required for its revival and progress. They knew that it was cheaper capital, cheaper fuel, cheaper labour, and cheaper materials generally, and that power costs under the existing conditions represented but a small percentage of total costs. The provision of cheap heat in industry is a far more important thing. The manufacturers knew this. The Government did not. The Government were led by men whose interests were electrical. The Government took the wrong turning in the interests of industry generally; and the Government are pretty well aware of their mistake to-day. What, since April 1, has so quickly closed down many industries in the country? Not the absence of electric power, but the shortage of fuel for heating purposes. Millions of tons of coal and coke and many millions of cubic feet of gas are used annually in industry for heating. When fuel runs short, works have to close-down completely; and when the price of fuel is high (not the price of power), industry begins at once to feel the pinch and the effects in competition. When the fuel cost of the manufacture of a ton of pig iron comes out in this country to £3 15s. with a most efficient blast-furnace plant, and yet Belgian manufacturers can offer pig iron in this country at £5 15s., it is sufficient to make one reflect as to which is the superior factor in industry—heat or power. Heat is wanted in large quantities in almost every industry; but the Government three or four years ago were labouring under the impression that the one thing they must do at home was to cheapen power. The chances are that their schemes will make it dearer. Since then (now particularly) they have been learning that what they ought to have devoted their attention to was heat—not power. This was a blunder of a distinguished order.

Heat, the Superior Factor.

A Super-Station Wanted as an Incentive.

A communicated article in the "Electrical Review" on the work of the Electricity Commissioners admits that the optimism prevalent two years or so ago has proved to have been misplaced. The writer excuses the optimism largely on the ground that the subject had been investigated during the war by three separate Committees, all of whom reported in much the same sense with regard to the supply part of the question. What the electricity industry, perhaps more than the Government, is to be blamed for is that the statements and proposals of the Committees in respect of future electricity provision were taken at face-value. Very few competent men seemed to think it their duty to investigate the recommendations. There were some; but their views were pushed aside in favour of the popular ideas. Throughout the reports there was an obvious playing to the gallery; and this attitude was maintained until the passing of the 1919 Act. The Electricity Commissioners have been established; but the results so far are disappointingly meagre. This is not their fault, but the fault of the circumstances under which they have to work, which is to give effect to something upon which there is no unanimity. The writer puts the position in a nutshell when he says that the Commissioners had "to make some attempt to carry-out a somewhat impracticable policy, before settling-down to real constructive work." But up to the present not a single important step has been actually taken towards building a super-station. It is, however, clear that the writer is of opinion that to get one big station started would do more as an incentive to the promotion of the policy the Commissioners are entrusted to bring into actual being, than all the definitions of the form of control and administrative machinery which, "while by no means negligible, are of tertiary importance." There is recognition of the difficulty of finding money to erect big stations. Who will put the money down? While there are plenty of optimists on municipal electricity committees, they do not now get the same support as formerly from their finance committees and councils in regard to schemes of expansion; and there is no superabundance of private capital for this purpose. The article ends with the confident belief that the starting of one up-to-date super-station in London, whether municipal or company, would do much more to bring about future agreement than the establishment to-day of an unwieldly joint authority without real unity of purpose. There are examples of joint enterprise in electricity generation in London to-day; but they have not done much towards stimulating unanimity.

Fuel Oil for Electricity Generation.

The coal strike has again caused electrical engineers to turn, both theoretically and practically, to the subject of fuel oil as an alternative to solid fuel for the firing of their boilers. It is reported that one of the biggest electric power stations in London—Lot's Road—which supplies current for the underground railways, will soon be practically independent of coal. The Electricity Committee of the Leeds Corporation have transformed their boiler firing from coal to oil. By Monday morning last week, four boilers had been adapted; and it was stated that the remaining boilers would be converted during the week. Two or three of the London suburban stations have adopted oil fuel; and we believe there were other electricity stations burning oil on the peak load before the coal strike. Several stations are running on Diesel engines. The loss of business to the home coal mines is the gain of the imported oil markets. The Electricity Committee of the Grimsby Corporation are proposing to enter into a contract for the supply of fuel oil for the next two years—about 300 tons a year—at £6 10s. per ton; and others are doing the same. But £6 10s. per ton seems to us to be a tall price for a long contract for fuel oil, when the market quotation for Diesel oil is £6 15s. per ton, and for furnace oil £5 5s. Notwithstanding the greater calorific value of the oil, and the fact that it can be used with higher efficiency for boiler firing, £6 10s. is a heavy price to pay for (say) 42 million B.Th.U., compared with (say) £2 5s. for 28 million B.Th.U. in the shape of a ton of coal for boiler firing. The calorific value of a pound of oil is approximately 50 p.ct. higher than of a pound of coal; but according to some authorities about double the water can be evaporated per pound of oil. Even so, this does not justify nearly three times more being paid for fuel oil than for coal—at any rate, it does not seem so to us. Of course, oil compared with coal means saving in men and more thermal value can be stored in a corresponding cubical space. The over-all savings may justify a reasonable extra price compared with coal; but certainly, on a thermal basis other than for temporary use, £6 10s. per ton is extravagant for a long-term contract. In countries where the price of coal and oil are on a competitive basis, oil has—having regard to efficiency and convenience—greater application than in this country for land boilers. Several industrial establishments are applying it; and certain hotels have adopted or are adopting it for the boilers of private electric generating plants. There gas-engines should be strong competitors of both coal and oil.

Tariffs.

There is an uncomfortable feeling in the electricity supply industry that the tariffs in existence do not meet thorougly the altered conditions of to-day, that they would not bear a critical scientific test, and that they are not framed with sufficient discrimination for the development of all uses. Two papers on the subject have been before the Institution of Electrical Engineers—one by Mr. J. R. Blaikie, and the other by Mr. J. W. Beauchamp, Director of the Electrical Development Association. We cannot investigate the papers at length. But from Mr. Blaikie's paper, we may extract a table which shows that since the price of coal has risen enormously, and rates of wages, &c., have increased, there has been a remarkable change in the relative values of the components of the fixed charge. This is the table:

	Hopkinson Hypothetical Station. Per Cent.	Actual Case, 1914 to 1915. Per Cent.	Actual Case, 1919 to 1920. Per Cent.
Coal	21	23	32
Other charges	22	37	42
Capital	57	40	26
Total	100	100	100

The figures show how greatly the incidence of the items constituting the fixed charges has varied in existing stations; but we imagine the capital figure in the last column would have to undergo considerable change in the case of work being carried out to-day. It is considered by Mr. Blaikie that the time has come to draw distinctions between consumers in (say) two groups, principally in regard to the coal and wages portions of the fixed charge. Dividing consumers broadly into two groups in this way—viz., those who require a supply for seven days a week and those who require a supply for six days a week, there is found in the seven-day group, public lighting, domestic lighting, some heating, a small amount of power, and, in certain cases, traction supply; in the six-day group, practically all factory power and lighting supply, shop lighting, and some heating.

Tariffs and Groups of Consumers.

In his paper, Mr. Beauchamp advocates the multi-part tariff, the progress of the application of which he thinks has been delayed by too strong a desire to fix upon a correct or uniform tariff, rather than an acceptance of the underlying principle. Tariffs should be considered in relation to groups of consumers, not individuals. The multi-part tariff and its calculation involve consideration of the running rate or rates per unit for the energy supplied (which are easily determined) and the fixed charges (which present greater difficulties). The fixed charge, in his opinion, should be a function of the standing costs which the consumers or groups of consumers may entail as development proceeds. It must be related to kilowatts installed or maximum demand; allowance being made for the character and diversity of the load resulting from the different uses of the supply. The maximum lighting demand of consumers seems likely to decrease by reason of development of the electric lamp and by the more scientific use of it. But the relation between maximum demand, units used, and service rendered may be stable for a long time to come in the case of heating and cooking, subject to progress and inventions in regard to heat storage. It is, therefore, suggested by Mr. Beauchamp that lighting should be dealt with by itself, and an annual charge in regard to it determined, after which further annual charges should be evolved for all other uses of the supply by considering the consumers where possible in groups. In this way one can obtain a clearer view of the influence of groups of houses on the load curve and the mains. The home supply tariff may start with quite a high rate for normal lighting, and may secure a fair price for small additional use in fans, kettles, &c., but should continue to decrease through the consumption in cookers, fires, &c., ending in a minimum value which would apply to storage heaters or other 100 p.ct. load-factor uses.

Mutual Help.

The "Electrical Times" says: "Business competition does not necessarily mean personal enmity. As witness the case of the Altrincham Electric Supply Company and the Gas Company of the same town. These rivals get on quite well together. The electrical men have coal, and are helping out the Gas Company. The latter reciprocates with coke breeze as far as it can. Healthy competition combined with human fellowship such as this is a bright spot in the dark industrial cloud." We recorded a case on May 4 of a gas undertaking sending coal to an electricity station, in order that the power supply for the electricity-driven part of the plant at the gas-works might continue to have the necessary energy supplied to it. Coke, breeze, and fuel oil—products of gas-works—are being heavily drawn upon by electricity stations.

The Haber Ammonia Process.

A detailed description has been communicated by Prof. J. R. Partington to the "Journal of the Society of Chemical Industry" of the Oppau synthetic ammonia plant of the Badische Anilin und Soda Fabrik. The Oppau works, which are said to have cost £15,000,000, were commenced in 1913, with a capacity of 20 tons of ammonia per day; and during the war this was increased to 200 tons. The Company's second factory was erected subsequent to 1916, and has a capacity of 400 tons of ammonia daily. These are known as the Leuna works. The combined output of Oppau and Leuna—210,000 tons of ammonia per annum—is equivalent to over 800,000 tons of sulphate of ammonia, or 1,050,000 tons of sodium nitrate. The statement was made that Germany in 1916 made, by all processes, 400,000 tons of synthetic fixed nitrogen. Besides synthetic ammonia, other salts—such as the chloride and nitrate, and mixed salts for fertilizers—are made at the Haber factories. The power for both the plants referred to is derived from lignite. In the Oppau works, a row of twelve "Bamag" producers, with rotary grates (a little steam being added to the air), each consuming 20 tons of lignite, and yielding 2 million c.ft. of gas per day, is built alongside a similar row of water-gas generators, which provide the hydrogen. The latter use Ruhr oven coke, and are of the Pintsch type, with rotary grates, each gasifying over 30 tons of coke to 3 million c.ft. of gas daily. The water gas is treated by the Badische process, in which a mixture of water gas and steam is passed over a catalyst consisting of ferric oxide, with promoters, at a temperature of 400° to 500° C. The purification of the gas after it issues from the converters is an important part of the process. The purified hydrogen (with some nitrogen from air mixed in the water-gas operation) is afterwards passed to a catalyst plant in which the mixture is converted into ammonia. An iron catalyst, with a promoter, is used. The ammonia is removed from the gas by solution in water under pressure.

Removing Lead from Pipe-Joints.—The March issue of "Industrial Gases" illustrates a 36-in. cast-iron water-main which has recently been taken up from the centre of the high road between East Hill and High Street, Wandsworth. The method employed for melting the lead caulking out of the joints was the oxy-acetylene blowpipe, of similar construction to that used for welding. To carry out the operation, however, it was found advantageous to adjust the acetylene supply to obtain a longer flame than that used for welding, in order to ensure its penetration and the melting-out of all the lead to the bottom of the joint. The operator begins at the top of the pipe-joint, and works down each side until the lead has been removed from about two-thirds of the circumference. After this has been done, the length of pipe is slightly lifted at the opposite end, and, if necessary, wedges can be placed on the inside of the end to be removed. When, therefore, the pipe section is lowered, it readily draws the joint away. The time occupied to remove the lead from each joint was about 45 minutes, and the quantity removed was 50 lbs. There is no waste, as the molten metal flows in bulk, and is therefore easy to collect.

A LONG-DISTANCE PRESSURE INDICATOR.

By H. C. Widlake, A.M.I.E.E.,
of the Plymouth and Stonehouse Gas Light and Coke Company.

In placing this contribution before readers of the "Journal," the author feels a peculiar satisfaction in the knowledge that he is opening what is practically virgin soil, inasmuch as no serious effort has ever been made to provide the gas engineer with facilities for observing and recording continuously at the gas-works the gas pressures prevailing in districts of supply remote from the works. The need of such facilities, though always keenly felt, has never been loudly voiced—due in all probability to the apparent impossibility of such an achievement.

By no means the least of the factors which have contributed so largely to the success of electricity supply undertakings is the ease by which the central station engineer can keep his feeder loads and distributing centre pressures under the most literally constant visual observation and is able to note every change and momentary variation in connection therewith. The methods, however, by which such information is obtained are peculiar to electrical science; and the gas industry possessed no equivalent of the load ammeter and the pilot feeder voltmeter till quite recently, when the introduction of the "Thomas" gas station meter put into the hands of the gas engineer an instrument which, in relation to the flow of gas, affords the same information in the same convenient form as does the ammeter and wattmeter in relation to electricity supply.

So far as information concerning the gas pressures prevailing in the districts of supply is concerned, the gas engineer, in the absence of better means, has always been compelled to trust to the following methods, either singly or in conjunction: (*a*) The employment of district pressure testers; (*b*) telephonic communication between districts and works; (*c*) installation of graphic pressure recorders at certain points in each district. Methods (*a*) and (*b*) used in conjunction represent at present the quickest possible method by which the works' staff can be made acquainted with outside pressure variations or irregularities; and it need scarcely be pointed out that such information is necessarily belated, while its accuracy depends entirely upon the human element. Method (*c*), while undoubtedly accurate, only furnishes the works' staff with information as to outside happenings hours after they have taken place.

Bluntly speaking, so far as immediate information or even timely warning in regard to any untoward happening outside the works is concerned, the above three methods are wholly useless; and the first intimation the gas engineer has of any failure of adequate supply is the presence on the telephone of a host of distracted consumers. Unsatisfactory as such methods have been in the past, it is very certain that their limitations will be found even more galling in the future in view of the legal obligations of gas suppliers in regard to minimum pressures and the supply of gas to railway centres. These considerations make one realize more than ever the pressing need of a device which shall afford at the gas-works a continuous visual or graphic record of all pressure variations in those districts of supply in which any irregularity might be attended by serious consequences.

For some years the author has been working on the problem of building an apparatus which would fulfil the above-mentioned conditions; but it was only as recently as January, 1920, that he succeeded in evolving an instrument which could safely be entrusted with so vital a duty. A recital of the many experiments, successes, and failures leading up to the apparatus forming the subject of this article would serve no useful purpose. It is sufficient to state that the type eventually evolved has surpassed all the inventor's expectations, and may very well bring about a revolution in the existing methods of district pressure control.

Fig. 1 has been prepared in order to illustrate the manner in which the device performs for the gas engineer exactly the same function as does the feeder pilot voltmeter for his electrical colleague. The sketch shows the "Widlake" pressure register installed between the end of a long gas-main and the gas-works; the connection between the two points being made by a loop line leased from the telephone authorities. In practice the district end of the apparatus would be installed at some key-point in each district. By the term key-point is meant some point in the district at which the gas pressure, being known to be correct, may be safely taken as an indication that the entire district is adequately catered for. The apparatus employed falls under three headings:

1. A special form of pressure gauge installed on the district.
2. An electrical circuit between the district and the works.
3. Specially calibrated indicating or recording meters situated at the gas-works, together with a small battery of primary cells and certain apparatus for periodically checking the accuracy of the device and for ensuring against its unnecessary employment.

The principle upon which the apparatus works is as follows: The special form of gauge installed at a key-point in the district which it is desired to keep under observation is virtually a gas-actuated current-adjusting device, and is constructed in such a manner that any variation in the pressure of gas supplied to the gauge effects a corresponding alteration in the amperage flowing in the electric circuit in which it is connected. In this manner

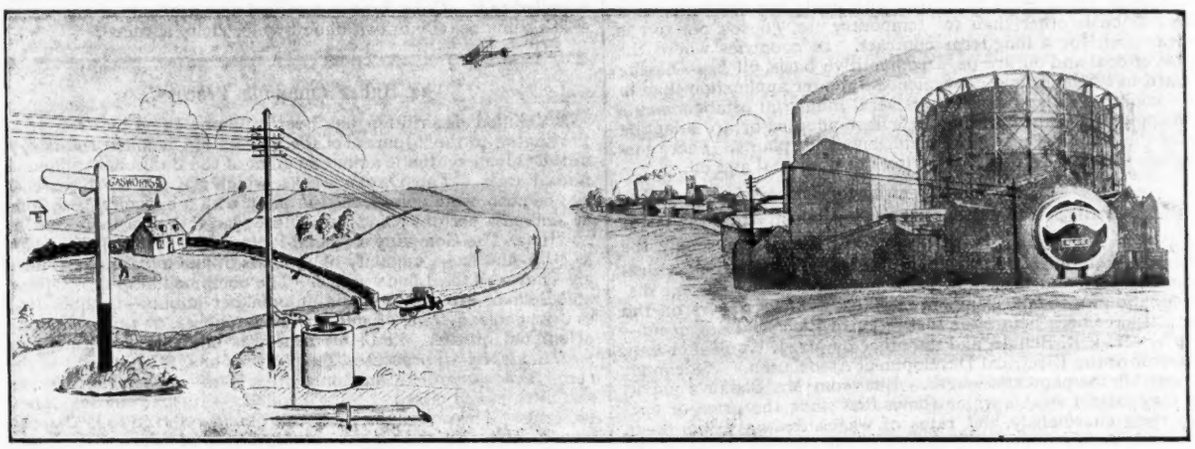


FIG. 1.

the amount of current flowing in the circuit at any moment is proportional to the pressure of gas within the body of the gauge, and being transmitted to the works (or other desired point) for measurement, is read on the dial of a meter calibrated not in electrical units but in tenths of an inch of gas pressure. The works attendant regards this instrument purely as a gas-pressure gauge, and derives the required information direct from it without the necessity of using any factors of correction or conversion. The arrangement of the apparatus at the works end will depend entirely upon local conditions; and, if desired, more than one indicator may be fitted at different parts of the works and may be arranged to work in series, so that the pressure in the district may be read at any one of (say) three or four different points on the works. In order to get the maximum useful life out of the batteries, the switch by which the device is brought into operation is time-limited and will open circuit after a predetermined period. This ensures that the gauge will only be used when an observation is required, and prevents its being needlessly left in circuit. It is hardly necessary to point out that this is a refinement of considerable value and will easily prolong the life of the batteries by which the device is worked by 600 or 700 p.ct.

A very clear view of the gauge itself is shown in fig. 2. The body of the tank is circular, and is so constructed as to form a U tube, one limb of which is concentrically disposed relatively to the other. The pressure of gas in the system to which the device is connected acts on the column of water in the outer chamber, and causes a corresponding variation in the level of water in the inner chamber, which is equivalent to the open end of a U tube gauge. A circular float rising and falling on the surface of this inner column of water accommodates a special mercury container built-up of insulating material. On the top of the tank accommodation is provided for a heavy cast-brass spider, a view of which, with its fittings, is given in fig. 3. This spider is bored out to take a circular insulating base into which are fitted a

FIG. 2.

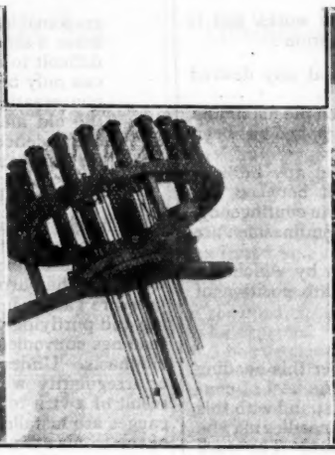


FIG. 3.

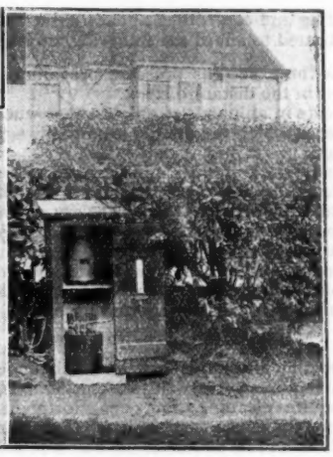


FIG. 4.

number of contact needles arranged in the vertical plane. At a higher point on the spider a circular gallery is fitted for the purpose of accommodating a number of resistance elements, which together with the needles are clearly shown in the figure. From this bank of resistances, taps are taken to the respective needles, and are soldered to the caps thereof. The spider with its needles and resistance elements is self-contained, and may be removed bodily from the gauge in thirty seconds for inspection or cleaning. The screwed pillars on which the spider is accommodated permit of the finest degree of vertical adjustment being effected.

A photograph of the gauge as described above is shown in fig. 2, from which a general idea of its construction may be obtained. The gauge illustrated is the one which has been in use for the past nine months on the Mutley district supplied by the Plymouth and Stonehouse Gas Light and Coke Company; and in fig. 4 it is shown housed in the private garden of a house on Mutley Plain. It is accommodated in a small box, on the upper shelf of which will be noted a graphic recorder. This recorder has no connection with the gauge forming the subject of this article, and is a relic of the days when its 24 hours old record was the only guide the works possessed in connection with the maintenance of an adequate pressure in this large and remote district.

From the box shown a loop line that has been leased from the Post Office Telephone authorities runs back to the gas-works at Coxside—a distance of two miles by road or three by the telephonic route. At the works' end the line terminates in the booster house, where are installed the electrically driven boosters used at times of heavy demand for augmenting and regulating the gas supply to the Mutley district. At this spot are installed the batteries supplying the current for working the device together with apparatus for checking its accuracy and registering the pressures. Fig. 5 shows a general view of the apparatus mounted on

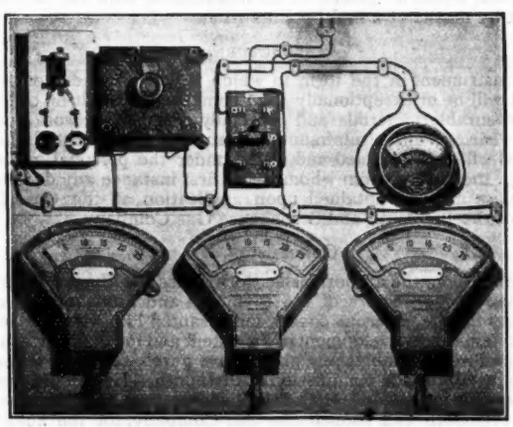


FIG. 5.

the wall of the booster house. It will be noted that the pointers of all four instruments shown lie at zero. This is due to the fact that in taking this view a very long exposure was necessary (for obvious reasons it was impossible to take a flashlight photograph), and it was feared that the movements of the pointers might spoil the photo. In order to avoid this, all four meters were zeroed. The three instruments shown at the foot of the photograph are ordinary gas-pressure gauges connected to the outlets and inlets of the boosters. All apparatus shown above these gauges is associated with the Widlake long-distance pressure register. The circular instrument on the right-hand side of the illustration is calibrated in tenths of an inch of gas pressure, and has a range of 0-100 tenths. The hand rheostat together with the resistance shown at its left-hand side is employed for the purpose of periodically compensating for (*a*) the falling potential of the batteries; (*b*) the deterioration of the exterior circuit loop; and (*c*) seasonal temperature variations.

Description of Working.

In order that the working principle of the apparatus may be understood, it must be remembered that the portion situated at a point remote from the works is really a sensitive form of current regulator automatically operated by a rising and falling float which in turn is actuated by variations in the pressure of the gas-supply system to which the instrument is connected.

Let us take the case of a gauge which reads up to 60-10ths of an inch water column and whose lowest reading is required to be 10-10ths. When the device has been properly water-lined and the gas turned on, the circular float carrying the mercury container commences to rise; and when the pressure within the outer limb of the gauge has reached 10-10ths, contact is effected between the two longest downwardly projecting needles. An electrical circuit is at once made; and current flows from the positive pole of the electrical battery at the works, through the compensating devices, and to the gauge *via* one side of the leased circuit. Passing through the whole of the resistances mounted on the body of the gauge, the current returns to the negative pole of the works battery *via* the other side of the leased accommodation line and the specially calibrated meter. The magnitude of the current so set-up is limited by the arithmetical sum of the following resistances: (*a*) The windings on the body of the gauge. (*b*) The loop accommodation line. (*c*) The compensating rheostats at the works. The total sum of these resistances is arranged to be such that at the moment under consideration (*i.e.*, when the gauge is actuated by a pressure of 10-10ths of an inch of water) the meter at the works shows a reading of 10-10ths.

As the pressure of the gas within the body of the gauge increases, a third needle comes into contact with the mercury when a pressure of 12-10ths is reached and such an amount of resistance is cut out of circuit as to increase the reading at the works end from 10 to 12-10ths. In this same manner every increase of gas pressure within the body of the gauge brings about a corresponding increase in the amount of current flowing between the gauge and the battery at the works. The resistances on the gauge are so calibrated as to give on the works' meter at all times a reading which numerically corresponds with the gas pressure that prevails at any given moment within the body of the gauge.

The Connecting Circuit.

So far as district use of the gauge is concerned, the best method of effecting an electrical connection between the gauge and its instruments is by using a private accommodation loop which may be leased from the Post Office Telephone authorities, whose attitude towards the device is distinctly favourable, and who are prepared (engineering conditions permitting) to provide accommodation for the instrument in any town at a fixed annual rental. The conditions on which this service is afforded are not onerous, and place no difficulties in the path of intending users.

It is important to note that before an instrument can be completed, it is desirable that the loop accomodation line leased from the Post Office authorities should be actually installed, its resistance tested, and the figure communicated to the builder of the gauge, in order that he may work to an actual figure obtained by test rather than to an approximate one derived by calculation. The correct determination of the resistance of the connecting circuit is of the utmost importance and is taken into the most minute account in the construction of the instrument. Every gauge supplied will be fitted with a special form of unloading device, the purpose of which is to prevent the accidental unwatering (and hence the subsequent inaccuracy) of the instrument, due to its being subjected to a higher pressure than that for which it was designed.

The indicating and controlling apparatus at the works' end is specially calibrated to afford the following information:

(*a*) To show the exact gas pressure prevailing at any desired moment in the distant district.
(*b*) To indicate in an unmistakable manner when the maximum pressure at which the district is normally supplied has been exceeded.
(*c*) To indicate in an unmistakable manner when any fault or irregularity occurs upon the leased circuit between the works and the district. This is a very remote contingency, but is possible during a severe storm or when linesmen are at work on the particular route.
(*d*) To afford (if desired) an immediate means by which the telephone engineer can locate the approximate position of any fault which may be reported to him.

Maintenance and Reliability.

It is a rather difficult matter to write much under this heading as the register requires so very little attention. The nest of contact needles requires cleaning about once a fortnight; and with this necessity in view the gauge is so designed that the needles may be removed bodily from the container in half-a-minute. The work of removing, cleaning, and replacing the needles and the water-lining of the gauge takes about ten minutes. The batteries by which the instrument is worked require cleaning and recharging very occasionally. Beyond these attentions the entire installation, like the magneto of a motor car, is best left alone.

The following is all that need be written as to its reliability. The gauge employed on the Mutley district supplied by the Plymouth Gas Company has been in continuous use since July, 1920; and from that date to the present time it has worked without a hitch of any sort and without the necessity of any attention other than that mentioned above.

The Applications of the Register.

After the foregoing description of the gauge and the purpose which it fulfils, there is little need to go very deeply into the question of its sphere of usefulness. There is no gas engineer who has done the author the honour of perusing this article but will have mentally viewed the possibilities of the device in relation to his own particular distribution problems.

The objective of a gas undertaking with its manifold complications and intricacies is the maintenance of an adequate pressure of gas at all hours of the day and night in the districts supplied. The extent to which the human element, blind trust in governing devices, assumption, and rule-of-thumb and indirect methods are respectively relied upon to bring about the desired result is too well known to be enlarged upon. The rapid growth of suburban districts, and the steadily increasing popularity of gas as a fuel for household and industrial purposes are factors which have brought gas engineers all over the country face to face with the necessity of relaying their main pipe-lines or alternatively of finding some means of increasing the delivery capacity of their existing mains. The high costs of material and labour are effective arguments against any extensive relaying scheme; and in many cases the alternative to this step has taken the form of installations at the works' end of power-driven pressure-raising devices working in conjunction with district governors. However effective these methods may be, their maximum efficiency is only attained if the objective of the plant (*i.e.*, the maintenance of adequate district pressures) can be kept under close observation at the works' end.

It is in order to afford this ease of district pressure control that the apparatus forming the subject of this article has been developed. The following are some few of the advantages which inevitably follow upon its installation.

(*a*) The works' staff can tell at all times—with no greater effort than is required to read the dial of a timepiece—the gas pressure prevailing in districts.
(*b*) Considerable savings will result in the wages of district pressure testers.
(*c*) All pressure variations will be recorded and indicated synchronously with their occurrence; and no time limit occurs between a variation and the knowledge of the variation on the part of the works' staff.
(*d*) Disputes and disagreements between the works and the distribution staffs on the subject of district pressures are no longer possible.
(*e*) In the case of works using power-driven pressure-raising plant, considerable savings will be effected in fuel and attendance charges, due to the fact that the works' staff being kept automatically acquainted with the district pressures, the pressure-raising plant will be only run when actually required, and will not be run-up early and shut-down late in order to be "on the safe side."
(*f*) In addition to the saving in the actual hours of running as indicated in the preceding paragraph, the pressure-raising plant will run under a smaller load, as, the district pressures being known, the plant will be run at whatever speed is necessary in order to maintain the desired pressure, and will not be overrun (so throwing useless work upon both the plant and the district governors) simply in order to be "on the safe side." This will again lead to economy in fuel.
(*g*) The use of the apparatus induces on the part of the men responsible for the maintenance of proper district pressures a sense of confidence and security which it is very difficult to describe effectively. This psychological factor can only be fully appreciated by anyone who enters into conversation with men who, after years of working to the old methods, have actually experienced the manifold conveniences which this new instrument, with its scientific certainty and absolute reliability, confers upon its users.

Inside the Works.

Although primarily designed for use between the gas-works and some remote portion of the district of supply, there is a wide sphere of usefulness for this device within the precincts of the works for the purpose of centralizing the more important of the pressure gauges installed at various points of the gas manufacturing and purifying plant. The many advantages of having these readings conveniently centralized are too obvious to need much emphasis. Under the conditions at present existing, any chokage or irregularity which may occur can only be detected as the result of a visit to a number of scattered points where pressure gauges are installed. Much valuable time is lost before the seat of the trouble can be located; and no account is taken of the fact that the conditions leading up to the occurrence may have changed while the plant attendant is making his round of the gauges. If existing gauges were replaced or supplemented by long-distance pressure registers with their respective readings centralized at some convenient point on the works, any irregularities could be detected instantly, and their effect throughout the entire system kept under the most constant observation.

For such duty the gauge employed would differ very materially from that put forward for district working; and the connecting circuit between the instrument and the indicating meter would be privately owned—no rental charges being incurred. For use within the precincts of the average works, no more battery power would be required than that usually provided for ordinary bell working.

Special Arrangements.

This long-distance pressure register is readily adaptable to the particular requirements of each individual purchaser, and a number of switch combinations are possible. It often happens that the information transmitted from the distance register may be required at more than one point on the works—as for instance, in a meter, governor, or booster house, or in a superintendent's office. In such cases the readings transmitted from one district may be shown simultaneously at any reasonable number of points on the gas-works. If simultaneous readings are not required but more than one point is to be served, extension lines can be run to the desired locations; and by means of a multi-point switch the distant register can be placed in communication with any desired point.

Where it is desirable to keep first cost as low as possible, the above-mentioned points can be equipped with a plug service from which connections can be made to a portable indicating instrument that would be moved from one point to another as required. Another combination with the object of reducing first cost consists in the employment of one indicating instrument at the works in conjunction with any desired number of district registers. The instrument would be placed in communication with the desired district by means of a multi-point switch.

Manufacture.

The instrument in the form in which it will be placed on the market will be of exceptionally solid construction, built-up of the best procurable materials and especially designed to work year in and year out with a minimum of attention. Each installation supplied will be assembled and tested under the personal supervision of the author, from whom in the first instance any desired particulars may be obtained upon application at the Coxside works of the Plymouth and Stonehouse Gas Company.

Conclusion.

In conclusion, the author wishes to express his thanks to the Chairman and Directors of the Plymouth and Stonehouse Gas Company for the generous concessions granted him with respect to the commercial development of his patent and for the courteous permission which enables any prospective purchaser to view and test the installation in commission at Plymouth. He also desires to express his indebtedness to Mr. P. S. Hoyte, the Chief Engineer of the Plymouth and Stonehouse Gas Company, for the kindly encouragement and co-operation which have so largely contributed to the success of the device.

There have been reprinted together in pamphlet form (price 1s.), by the Lancashire and Cheshire Coal Research Association, papers on the "Inorganic Constituents of Coal, with special reference to Lancashire Seams," by Messrs. F. S. Sinnatt (Director of Research to the Association), A. Grounds, and F. Bayley, and on a "New Characteristic for Coal: the Agglutinating Power Curve," by Messrs. Sinnatt and Grounds. There has also been reprinted from the "Journal of the Society of Dyers and Colourists" a paper read by Mr. Sinnatt before the Manchester Section last January, entitled "Methods for the Identification and Valuation of Coals."

THE DEHYDRATION OF WATER-GAS TAR.

[COMMUNICATED.]

WATER-GAS TAR, being in the emulsified state practically a useless bye-product of the manufacture of carburetted water-gas, is more or less a nuisance to those engaged in the industry—particularly in respect to its disposal, since it is considered unmarketable by reason of the very high percentage of water that it contains. It is not, for obvious reasons, permissible to run it into sewers or neighbouring streams; and the only alternative left to the gas-works' engineer is to separate the constituents by distillation, or to store the emulsion in tanks in the hope that some time or other some suitable means will be provided for its ultimate disposal. Both these courses are, from many points of view, distinctly disadvantageous.

If the tar can be efficiently and cheaply separated into oil and water, the oil becomes a marketable product—always provided that the moisture content can be brought below 5 p.ct., and the separated water, if oil-free, can be readily disposed of. Hitherto it has been impracticable to obtain such an efficient separation (other than by distillation), by reason of the emulsion being very intractable in character—a fact probably due to the amount of free carbon which might be said to be in a state of colloidal suspension. The difficulty of breaking this emulsion, and so obtaining an efficient separation, has now been overcome by subjecting it to the high centrifugal force generated by the Sharples super-centrifuge, the rotor of which revolves at a speed of some 17,000 R.P.M.—thus producing a separating force of 16,960 times that of gravity.

Briefly, the method of application is as follows: The emulsion is heated in a tank, by means of a steam-coil, to a temperature of 75° or 80° C., and so arranged as to flow by gravity into the rotor of the centrifuge, where it is immediately separated into its constituents. The suspended solid matter is deposited in the form of a cake on the inside of the periphery of the rotor. The oil and water are continuously discharged from separate outlets.

This process affords a means of converting the troublesome emulsion into a good saleable oil containing less than 1 p.ct. of moisture. The water is oil-free; so rendering its disposal a simple matter. The cost of treating the water-gas tar emulsion in this way is less than 1d. per gallon, including interest on capital, depreciation, labour, repairs, and power.

The suggested system of dealing with tar emulsions, while new in this country, has been in successful operation in the United States for the past six years, where, on this problem alone, considerably more than a hundred machines are continually employed.

The Research Department of United Water Softeners, Ltd., has recently carried out a number of experiments for some of the principal gas undertakings in the country for the dehydration of their water-gas tar emulsions with Sharples super-centrifuges; and in no single instance has the emulsion failed to separate when subjected to this high centrifugal force—producing an oil with a moisture content never greater than 1·5 p.ct. In some cases, a perfectly dry oil has been obtained, without a trace of water. It will, therefore, be seen that if water-gas tar emulsions are treated in this way, what has hitherto been a nuisance to those connected with the manufacture of carburetted water gas and a drug in the industry, can readily be converted into a commercial product constituting a source of revenue.

Masonic—Evening Star Chapter.

On Wednesday last, the Annual Convocation of the Evening Star Chapter, No. 1719, was held at the Freemasons' Hall, London, when the following were elected to office for the year 1921-22:

Ex. Comp.	William Belton	M.E.Z.
,, ,,	A. C. Beal	H.
,, ,,	W. R. Silk	J.
Comp.	Rae P. Normand	Scribe E.
Ex. Comp.	W. A. Surridge	Treasurer.
,, ,,	J. W. Broadhead	D. C.
,, ,,	Arthur Valon	Scribe N.
,, ,,	F. C. Tilley	P. S.
Comp.	H. W. Packham	First A. S.
Ex. Comp.	S. Freeman Burrows	Second A. S.
Comp.	J. F. Wicks	Organist.
Comp.	C. Hulme	Stewards.
Comp.	E. Hazzard Harman	
Ex. Comp.	A. E. Croager	

Books Received.—Acknowledgment is made of the receipt of copies of the following new books: "Artificial Light: Its Influence upon Civilization," by M. Luckiesh, from the University of London Press, Ltd., published by Messrs. Hodder and Stoughton, Ltd., price 12s. 6d. net. "Coke Oven and Bye-Product Works Chemistry," by T. Biddulph-Smith, F.C.S., from Messrs. Charles Griffin & Co., Ltd., price 21s. "Heating Systems: The Design of Hot Water and Steam Heating Apparatus," by F. W. Raynes, from Messrs. Longmans, Green, & Co., price 21s. net. "Self-Instruction for Students in Gas Engineering (Advanced)," by "Mentor," from Messrs. Benn Bros., Ltd., price 10s. 6d. The last named is a fourth edition, and is in the form of answers to questions based on the Honours Grade syllabus in "Gas Engineering" of the City and Guilds of London Institute.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Annual General Meeting.

The Annual General Business Meeting of the Association was held on Friday last, at the Westminster Technical Institute—Mr. FRANK J. PEARCE (the President) in the chair.

REPORT BY THE PRESIDENT.

The PRESIDENT (after the minutes of the last meeting had been confirmed and a financial statement had been presented) said it was his pleasure to be able to place on record the report of a successful and useful session. The number of members present at the opening meeting gave an indication of the size of gatherings to be expected; and he was glad to say both lectures and visits had been exceptionally well attended—testifying to the keenness and interest of members generally. In point of numbers, the membership of the Association now stood at its highest; there being at the present time 249 members. At the commencement of the session, the membership stood at 224. He thought he was correct in saying that theirs was the largest of the Junior Gas Associations. It was hoped that the membership of the Association would continue to increase; and he took this opportunity of appealing to all those holding positions on the technical staffs of gas undertakings, and having the necessary qualifications, who were not at present members, to join. He would again draw attention to the educational facilities afforded by membership of the Junior Associations. A glance at the programme of the session would be sufficient to indicate the wide field covered by the papers which had been read; and the high standard set by the contributions received was apparent to all. Their best thanks were due to those who had assisted in this way, as well as to those Companies and firms who had thrown open their works for inspection. He suggested that a "short paper" evening should again be included in next session's programme—and possibly more than one—because he thought that members would probably come forward more readily if they knew a ten-minutes' paper was all that was required of them. The Sub-Committee set-up by the Junior Gas Associations to assist in formulating a scheme relative to the education of those who intend entering the gas industry had made good progress; and the recommendations made had been very favourably received by the Institution of Gas Engineers. The draft scheme was submitted to the Institution for discussion, and was now in the hands of the Board of Education, who it was anticipated would approve it, possibly with very slight (if any) alteration. An Advisory Committee of the Institution would be set-up in connection with the matter; and it was hoped the Junior Associations would be represented thereon. This would not, however, mean the termination of the Junior Sub-Committee, who would doubtless remain for the purpose of submitting suggestions from time to time to the Advisory Committee. The Secretary (Mr. J. G. Clark) had done an immense amount of work in connection with the matter; and he would like to record their appreciation of his services. It would be apparent, from what he (the President) had said, that the Junior Associations were now taking an active part in important matters affecting the future wellbeing of the industry; and, after all, this was only to be expected, when one realized that it was the young members of the profession who would ultimately take up important positions in the industry, and in the future be responsible for management and organization. Before leaving this subject, he would like to place on record their heartiest congratulations to two members who distinguished themselves last year in the City and Guilds of London examinations—Mr. E. C. Nash (South Metropolitan Gas Company), Silver Medallist, Final Grade, in "Gas Engineering;" and Mr. D. W. Evans (South Suburban Gas Company), Silver Medallist, Final Grade, in "Gas Supply." He trusted that their success might encourage other members to do likewise.

On the proposition of Mr. J. R. GALE (North Middlesex Gas Company), seconded by Mr. J. H. COOKE (Gas Light and Coke Company), the President's report was unanimously adopted.

A cordial vote of thanks to the officers and Council was next passed, on the motion of Mr. R. J. BEHENNA (Gas Light and Coke Company), seconded by Mr. C. J. LOVE (Gas Light and Coke Company), and was acknowledged by Mr. F. A. FROST.

TESTIMONIAL TO THE PRESIDENT.

Mr. S. B. CHANDLER (South Suburban Gas Company) referred to the good work done by Mr. Pearce as President, and moved that the following resolution be emblazoned, framed, and presented to him:

This testimonial, presented to Mr. Frank J. Pearce, records the esteem and appreciation of the Council and members of the London and Southern District Junior Gas Association for the valuable work accomplished by him during his year of office as President, 1920-21. His energy and enthusiasm have contributed very largely towards enhancing the reputation of the Association, and materially assisted in upholding its ideals and furthering its sphere of usefulness. Under his presidency, the membership has attained its highest level; and the position now occupied by the Association in the gas industry is ample proof of the capacity of its President. The members convey their sincere wishes for a successful career, and hereby express their best thanks for the services rendered.

This was seconded by Mr. F. AINSWORTH (Ilford), and heartily agreed to.

The PRESIDENT, in acknowledgment, said the duties he had had

to perform had been a very great pleasure to him; and this was the best indication he could give as to his feelings with regard to the Association.

New Officers.

The following office-bearers for the next session were then elected.

President.—Mr. F. A. Frost, South Metropolitan Gas Company.
Senior Vice-President.—Mr. D. C. Cross, Lea Bridge District Gas Company.
Junior Vice-President.—Mr. G. Winslow, Gas Light and Coke Company.
Hon. Secretary.—Mr. G. Winslow, Gas Light and Coke Company.
Hon. Treasurer.—Mr. A. Broadbent, Gas Light and Coke Company.
Hon. Auditor.—Mr. E. G. Merry, Gas Light and Coke Company.
Council for 1921-22.—Messrs. T. J. Beardmore, W. N. Booth, W. Grogono, L. Lacey, A. G. Chant, L. E. Wellard, F. E. Woodfine, W. L. Westbrook. *Ex-Officio:* Messrs. F. J. Pearce and S. B. Chandler.

The President said he hoped Mr. Frost would have a good session; for he was well qualified to take the chair.

Mr. Frost, returning thanks, remarked that it had been his pleasure to note during the last few years the loyal and hearty support always extended to the President by the Council and the members of the Association; and he felt sure he might, in his turn, look forward confidently to the same assistance.

New Class of Associate Members.

Alterations to the rules were then adopted for the purposes of creating a new class of associate members, of setting-up a qualification standard for those desirous of joining the Association, and of increasing the subscription for hon. members. The main changes and additions will be seen from the following quotations from the rules as they are now to stand; there were, of course, consequential alterations to other rules.

Rule 4.—Qualification: The honorary, ordinary, and associate membership of the Association shall be confined to persons engaged in a gas-works, coke-oven works, or any works dealing with the working-up of gas-works residual products under the control of a gas company or local authority, or otherwise associated with gas manufacture or supply, but who are not engaged in the manufacture of material or appliances used in gas manufacture or supply.

Applicants for full membership must be men possessing technical knowledge and ability who at the time of application hold a position on the technical or administrative staff of the undertaking. Applicants for associate membership shall be men who, in the opinion of the Council, do not hold qualifications which would permit of admission to full membership, but whose present position and attainment warrant the assumption that they are likely to become eligible to full membership.

The Council are empowered to exercise full discretion with regard to all applications.

Rule 6.—The honorary members' subscription shall be £1 1s., instead of 10s. 6d.

Rule 13.—Associate members will not have the power of voting at the annual general meeting.

These amendments were proposed by Mr. W. J. Liberty, and seconded by Mr. A. T. Gilbert. The former pointed out that, in view of the large number of persons who were wishful to join the Association, it had been felt necessary to have a little "tightening-up" of the rules.

The President said an associate member would not be debarred from any privileges which an ordinary member enjoyed, except that he would have no voting power.

Mr. Chandler expressed the opinion that the proposal now adopted was a great step forward, and would have a far-reaching effect upon the future of the Association.

GAS PROGRESS RELATED TO B.Th.U.

The subject of gas progress in relation to British thermal units was discussed before the Missouri Gas Association by Mr. Alfred I. Phillips, of New York, who said that, granting it was necessary in the United States to give up oil for gas making, or at least to relinquish its use in anything like present quantities, it seemed to him there are three possible directions for the development of the gas industry in the future. The first of these is the replacement of water-gas plants with coal-gas equipment, and the manufacture of straight coal gas having a heating value of 500 to 575 B.Th.U. Under this plan, the present-day standard would remain practically unchanged. The second direction is the retention of the present water-gas equipment and the distribution of gas made with a little oil or even blue water gas properly "odorized." The heating value of blue water gas would be about 300 B.Th.U. Thirdly, there is the building of additional coal-gas equipment to make its ratio to the water-gas generating apparatus now in use such that all the coke produced would be used in water-gas manufacture. Little or no oil would be employed; and a gas having a heating value in the neighbourhood of 400 B.Th.U. would be furnished. In this case the change from present-day standards would be radical, but not so great as under the second possible plan.

As to the first plan—the complete replacement of water gas by coal gas—it has to be borne in mind that in 1920 there were produced between 200 and 250 billion c.ft. of water gas; and to replace this water-gas plant with coal-gas equipment at the present time would require an expenditure of not less than a billion dollars. The interest on this, together with the amortization charges on the old water-gas equipment, would have to be met, and would constitute an intolerable burden on the gas-consuming public. But apart from finances, there are various practical considerations which would probably render this course out of the question. With regard to the distribution for domestic use of a properly "odorized" blue water gas, he was advised that some years ago water gas of a heating value of only 300 B.Th.U. was distributed to what is now part of Chicago. No primary air was necessary, the service was satisfactory, and so far as he had been able to determine the mortality rate among the consumers was the real factor finally responsible for its discontinuance. Had "odorizing" been understood at that time, blue water gas might have continued to be supplied. Blue water gas would be economical to manufacture; but the volume required would undoubtedly be considerably increased, because of the lower heating value. More plant and holder capacity would be called for; and present distribution systems would in most cases prove inadequate to supply the greater volume of gas needed. It is believed that in the end the service in most cases would prove more costly with blue water gas than under the third plan, which seems the logical line of development for the gas industry.

This course contemplates the development of plants for the complete gasification of coal, which possesses the advantages of practicability and economy, production of a minimum of bye-products (coke, &c.), and reduction in heating value with minimum cost of service. As a general proposition, economic conditions, coupled with practical manufacturing considerations, point towards the complete gasification of coal, and the distribution in future of a gas of about 400 B.Th.U. per cubic foot—provided the industry is allowed freedom to develop in a manner to render the maximum service to the community.

CONTROL OF WATER-GAS PLANTS.

The "W. R." Combustion and Producer Indicators were described by Mr. H. T. Ringrose, B.Sc., at the annual meeting of the Iron and Steel Institute; the author concluding with a few remarks on the control of water-gas plants.

Though, he said, water gas cannot claim in the iron and steel trade the importance of producer gas, still, owing to its high calorific intensity, it becomes more extensively used each year for purposes where high temperature is the first essential—such as in welding processes. Its chief use is, of course, in gas-works, where, after carburation, it is mixed with coal gas from the retorts. The distinction between ordinary producer gas and water gas is that in the former a mixture of air and steam is passed continuously through the fuel bed in such proportions as will maintain its temperature conditions as nearly constant as possible, so that a gas of uniform composition is continuously generated. In the latter, the two gasifying agents—*i.e.*, air and steam—are admitted alternately, each for a definite period; and the products of the action of each are kept separate. In both cases gasification is complete—in one case uniformly, and in the other with alternating reactions. During the blow period, the percentage of CO_2 starts at a certain figure, depending upon the temperature of the furnace. The CO being then at its maximum, as the temperature rises the CO_2 increases until a certain maximum is obtained, and the CO is then at a minimum. As regards the run period, the CO_2 at the commencement is very small, but rapidly increases as the temperature of the furnace falls, due to the endothermic reaction with the steam. Thus, at any instant, the percentage of CO_2 is a direct criterion of the stage the reaction, either in the run or blow period, has reached.

To use a water-gas plant on truly scientific lines the only possible way is to work to the CO_2 content in the gases. Assuming that means can be devised which will enable the CO_2 to be ascertained continuously, and with a few seconds only of time-lag in the indication, it would be possible to have the plant brought under direct scientific control. Sufficient work has now been done on highly sensitive porous pots to convince the author that it is only a question of time and experiment before an instrument can be designed and made so sensitive as to show variations in CO_2 in a water-gas plant almost second by second. When this is accomplished, water-gas plants can be run on truly scientific lines, based on the CO_2 content at any instant in the gases, and consequently on knowledge, at a glance, of the exact stage of the reactions.

A German Illuminating Society.—"Engineering" says that the Lichttechnische Gesellschaft, established at Karlsruhe in March last, will, like the cognate American and the English Societies, devote itself to the varied technical problems of illumination, and intends to recruit its members from the ranks of gas, electrical, and other engineers, architects, medical men, official departments, &c. The Technical High School at Karlsruhe possesses an institute for technical illumination to which a testing station has recently been added—hence the selection of Karlsruhe.

AN AMERICAN GAS PURIFICATION INVESTIGATION.

By W. A. DUNKLEY and C. E. BARNES.

(*Concluded from p.* 268.)

Though considerable improvement in purifying conditions in individual cases can be expected by application of various suggestions, the process itself has inherent faults which cannot be avoided. It is cumbersome, requires heavy investment, and since it involves the handling of solid material must be costly in operation. Many gas engineers have looked forward to the day when some liquid purification process or some other process of similar theoretical merit would supplant oxide purification. Many such processes have been suggested, and more than one has had promise of practicability. The fact remains, however, that millions of dollars are now invested in existing equipment for purifying gas by iron oxide. Oxide purifiers are continually being built to supplement those now in use; and even were a more economical process worked-out for purifying gas, the replacement would necessarily be slow, since not all companies would be able to scrap existing equipment at once. Any study which will improve operation with present equipment is therefore worth while. It seems as though the greatest promise of material advancement in oxide purification generally lies in a more thorough knowledge of hydrated oxide of iron itself. Our knowledge of the material and the chemical and physical conditions affecting its performance is incomplete. Research work to bring forth this knowledge is needed. Standard testing methods by which the value of a particular material can be quickly and fairly judged are also needed. Until such studies are made, little radical advancement in oxide purification is to be looked for.

A co-operation for carrying on this work has been entered into by the American Gas Association and the agencies of the Illinois Co-Operative Mining Investigations. It is hoped that research work now in progress will solve some of the problems of oxide purification.

APPENDIX A.

The Steere Engineering Company formula for gas purifiers;

$$G = \frac{3000 \times (D + C) \times A}{S}$$

or,

$$A = \frac{G \times S}{3000 \times (D + C)}$$

Where G = maximum amount in cubic feet of gas, corrected to 60° Fahr., to be purified per hour.

S = factor for grains H_2S per 100 c.ft. of unpurified gas, as given in table below.

D = total depth of oxide through which the gas passes consecutively in the purifier set, and is obtained by multiplying the depth of such oxide per box by the number of boxes in series in the set. Where a single catch-box is used for two or more sets, disregard the catch-box in obtaining the factor D.*

A = cross-sectional area in square feet of the oxide through which the gas passes on its way through any one box in series of a set.

C = factor: 4 for two-box, 8 for three-box, and 10 for four-box series, respectively.

Where a single catch-box is used for two two-box sets, use factor C = 6.

3000 = assembling constant.

Value of S is:

Grains H_2S per 100 C.Ft. Unpurified Gas.	Factor.
1000 or more	720
900	700
800	675
700	640
600	600
500	560
400	525
300	500
200 or less	480

APPENDIX B.

Determination of the further usefulness of a given batch of oxide, according to the formula of Tutweiler and Kunberger:†

Average cost of purification	= Ac. per 1000 c.ft. of gas
Cost of new oxide	= Bc. per bushel
Residual value of old oxide	= Cc. " "
Cost of removing, revivifying, and replacing	= Dc. " "
Gas already purified by one bushel	= E thousands of c.ft.
Number of times oxide has already been used	= F times
Average H_2S content per 1000 c.ft.	= G pounds
Weight of one bushel of oxide	= H "
Per cent. of H_2S removed by test	= I p.ct.
Capital charge per 1000 c.ft.	= Jc. per 1000

* Duplex boxes, with two layers of oxide each and divided flow of gas, whereby half the gas passes through each layer, present the combined area of the two layers, but the depth of one layer only to the passage of the gas. Therefore the area "A" of a duplex box is the sum of the areas of the two layers of oxide or double the cross-section of the box. The depth "D" is the depth of one layer of oxide per box multiplied by the number of boxes in series in the set.

† "Some of the Physical Characteristics of Ferric Oxide": Proc. American Gas Institute, 1913, Vol. 8, Pt. 1, p. 476.

Then

$$A = \frac{(B - C) + (F \times D)}{E} + J$$

But J is a constant (practically for such a problem) that does not affect this calculation, so we may write it:

$$\text{Operating cost} = (A - J) = \frac{(B - C) + (F \times D)}{E}$$

The question then whether or not it will pay to use a batch again with any given absorption test I, depends upon whether:

$$\frac{(B - C) + (F \times 1)D]}{E + \frac{H \times 1}{G}}$$

is equal to, greater than, or less than the average (A − J). For the sake of a numerical example, let us assume that

(A − J) = 1.0c.
B = 35.0c.
C = 0
D = 5c.
E = 40. (1000 c.ft. of gas)
F = 4 times
G = 0·25 lbs.
H = 50 lbs.
I = 5 p.ct.

Then

$$(A - J) = \frac{(35 - 0) + (5 \times 5)}{40 + \frac{(50 \times .05)}{.25}}$$

So that using this batch would considerably increase the average cost. To get the minimum economical percentage that would just equal the average cost, we have—

$$I = \frac{G}{(A - J) \times H}\left\{(B - C) + [(F + 1) \times D] - [(A - J) \times E]\right\}$$

Substituting the assumed values we obtain—

$$I = \frac{0{\cdot}25}{(1 \times 50)}\left\{(35 - 0) + [(4 + 1) \times 5] - (1 \times 40)\right\}$$

I = ·10 or 10 p.ct.

In applying the above formula, part of the information is known and the remainder may be obtained by test. For example, the monthly cost statement, if carefully prepared and correct, will give the value (A—J). That is, the purifying operating cost (includes purifying labour and purifying supplies per 1000 c.ft.) Invoices for purifying material purchased *plus* freight and handling into storage give the value B, when figured per bushel. The value of C will be *nil* in many cases, but if the oxide is sold or used in such a way that a money value can be assigned to it, then the value per bushel can be readily obtained. D may be estimated by keeping careful account of the cost of emptying a box, handling the oxide during revivification, and putting back in the box, and dividing by the number of bushels so handled. The value of E is not so definite, since a particular batch may be credited with some work done by other batches. If a suitable plant for keeping account of oxide performance is followed, no difficulty should be experienced, since the average H_2S content of the gas (in pounds sulphur per 1000 c.ft.) as recorded, divided into the pounds of sulphur absorbed per bushel by the oxide, will give the thousands of cubic feet of gas already purified. Or, if an analysis could be made for the sulphur content of the oxide, the number of cubic feet of gas of average H_2S content corresponding to the sulphur per bushel could be readily computed. For example, assuming that the air-dried oxide averaged 30 p.ct. of sulphur, and that oxide weighed 50 lbs. per bushel, the sulphur-bushel would be 0·30 × 50 = 15 lbs.

15 lbs. = 105,000 grains of sulphur, or

$$\frac{105{,}000 \times 34}{32} = 112 \text{ grains of } H_2S.$$

If the average H_2S content of the gas is 100 grains H_2S per c.ft., then the gas purified by the oxide per bushel is

$$\frac{112{,}000}{1} = 112{,}000 \text{ c.ft.}$$

The number of times the batch in question has been used, F, can also be quickly ascertained from the batch record as illustrated in Appendix B. G, the average H_2S content per 1000 c.ft.

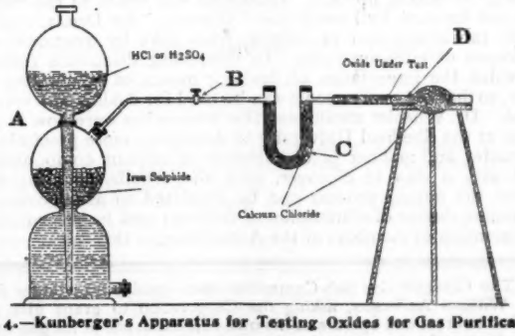


Fig. 4.—Kunberger's Apparatus for Testing Oxides for Gas Purification.

can readily be obtained from the record referred to over any period of time. The average content in grains per 100 c.ft. is multiplied by 10, and the product divided by 7000, to convert

grains to pounds. The weight per bushel of oxide, H, can probably be obtained with sufficient accuracy by spreading-out and air-drying a bushel of oxide made up from samples taken from all parts of the batch, and then weighing on a good scale. The value of I has to be obtained by a laboratory test.

The apparatus employed (apart from a chemical balance, which is essential) is shown in fig. 4.

In the sketch, A is Kipp gas generator made of glass, in which H_2S is generated by the action of hydrochloric acid or dilute sulphuric acid on ferrous sulphide. The generation and flow of gas are controlled by the stopcock B. The U-tube C contains granulated fused calcium chloride to dry the H_2S. The calcium chloride tube, D, contains in the straight part of the tube, 5 grains of the oxide to be tested, mixed with about 2 grains of coarse sifted sawdust, followed by granulated fused calcium chloride in the bulb of the tube. Little wads of glass-wool are placed in the ends of this tube, and between the oxide and the calcium chloride, to retain the materials in their proper places and prevent any dropping-out while weighing. Where sponge—viz., mixed oxide—is to be tested, no sawdust is mixed with the samples. A coarsely ground sample of the sponge is used. Care must be taken to get a truly representative sample.

After the tubes are filled, D is weighed on a chemical balance. Then it is connected to the apparatus, as shown, and dried. H_2S is passed through it slowly for one hour. During the reaction, H_2S is decomposed by the oxide, and water formed. The water formed is retained by the calcium chloride in the bulb of the tube therefore, the gain in weight of the tube during the time gas is passing through the tube is the weight of the H_2S absorbed; and the percentage is computed by dividing this gain in weight by the weight of the sample taken for test.

GAS PRODUCERS.

A paper on "Gas Producers" was read recently by Mr. N. R. Rees, of London, before the members of the Staffordshire Iron and Steel Institute, at Dudley. He pointed out that the essential features in the efficient and economic working of a producer were even distribution of coal, regulation of depth of fuel-bed to obtain as complete a reduction as possible of CO_2 to CO, and also the decomposition of the steam, removal of ashes and clinker in as simple a manner as possible, and low cost of operating and installation, with quick and efficient gasification.

At least 90 p.ct. of producers probably carried too thin a fuel-bed, this being due to the bad method of operation on the part of the gasman. Various attempts had been made to evolve a mechanical producer that gave an automatic method of feeding the fuel uniformly over the entire bed, and in small amounts at a time; also a method of agitating the fire-bed for the retention of a level surface and the prevention of holes or mounds, and the automatic removal of the ash. The question of mechanical producers had had particular attention in the United States. He had been testing a floating agitator with automatic feed; and it was claimed that the efficiency attained, the high quality of the gas produced, increased gasification, labour saving, &c., proved that the installation of mechanical producers would soon supersede the old hand-fed type.

Many producers—particularly of the hand-fed type—had been condemned on account of the high operating cost, which had been due entirely to the improper provision for coal and ash handling. It could not be over-emphasized that, in the installation of producers, due consideration should be given to the fact that, unless the money was properly laid out, the value of the investment was much reduced.

Sulphur in Coal.

In his recent paper, on "Sulphur in Coal," read before the Midland Branch of the Coke-Oven Managers' Association, Prof. R. V. Wheeler summarized our present knowledge respecting: (1) The forms in which sulphur can exist in coal; (2) the methods of determining the proportions in which the various sulphur-compounds occur; and (3) the behaviour of these compounds during the coking process. Reference was made to the suggestion put forward by Powell [see "Journal" for Dec. 1, 1920] to assist the elimination of sulphur from coke by treatment with hydrogen or coke-oven gas. An interesting discussion followed in which the importance of devising means of eliminating sulphur, so that the poorer coals can be used for coking, was emphasized. Dr. Wheeler announced that researches were now in progress at the Sheffield University to determine more precisely the character and manner of distribution of sulphur compounds in coal, with a view to discover, *inter alia*, whether and by what means the coking process can be regulated so as to cause the maximum degree of elimination of sulphur; and he welcomed the co-operation of members of the Association in this work.

The Glasgow Gas Sub-Committee have considered a letter from Mr. William Anderson, asking the Corporation to grant him permission to erect and operate at his own expense at one of the gas-works a small plant for demonstrating the merits of his two patented methods for the treatment of tar and the carbonization of coal. The Sub-Committee agreed to recommend that a portion of ground at the Temple gas-works be placed at Mr. Anderson's disposal.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Is Lighting Worth Keeping?—Experience of Croydon.

Sir,—I was very much impressed by the article, "Is Lighting Worth Keeping," which appeared in the "Journal" a short time ago, and hope that the general opinion in this country is in the affirmative. I have delayed my remarks until now, to enable me to summarize our working results in Croydon during the past season.

The whole secret in retaining existing business lies within the scope of an efficient maintenance department, coupled with show-rooms in which up-to-date fittings can always be seen under suitable conditions. We have for years made a big thing of our burner maintenance department; and it is, I think, due very largely to this that we experience such a comparatively small number of known cases where gas is superseded as the lighting agent. The fact that during the past six months we have only lost 26 consumers to electricity, while we have added nearly 1300 consumers to our maintenance system, does not, I think, point to any decline in this particular section of our business. We have also piped throughout for gas lighting during the year ended April last no less than 330 dwelling-houses, and in no single instance has this been done other than on a remunerative basis. As a further indication that domestic lighting is very much alive, I may mention that during the same period we supplied over 9000 burners.

With regard to new business, we always endeavour to obtain early knowledge of the type of property about to be erected. This enables us to approach the builder or architect with an offer of free advice or special terms for carcassing and installation work, before the plans are too far advanced. In the larger houses, we usually run the pipes for cooker, copper, geyser or circulating boiler, and fires; and in the medium and smaller types of houses lighting points are also included. Our experience is that in the two latter types gas is invariably adopted as the lighting agent.

With regard to business premises, churches, halls, schools, &c., we have during the past six months supplied no less than 482 indoor lamps and 221 outdoor lamps, without having lost a single case in competition with electricity. I attribute this result—which is trifling to what we hope to achieve next season—to the following facts:

1. That we advertise lighting, not only by the circulation of literature, &c., but by convincing people of the efficiency of up-to-date gas-lamps by fixing them at our own expense, on approval. A large number of lamps have been put up for demonstration purposes during the past season; and in every instance they have been retained and others added.
2. That every employee of the Company is encouraged to report any obsolete installation with which he comes into contact.

If gas undertakings lose their hold on lighting, it will probably be due to the fact that they wait for the business to come to them, instead of searching for it.

The science and practice of illumination has, I venture to think, been sadly neglected by gas undertakings as a whole, as has the commercial side of the business generally; and it is my firm opinion that, unless the industry awakens to the pressing need for commercial activity, not only will the lighting load be lost, but the growth of other remunerative business will be restricted. In every large undertaking there is adequate scope for the "commercial" or "utility" expert; and the industry must be prepared to pay him an adequate salary. I have long felt that our industry does not offer sufficiently tempting prospects to the particular type of man that is required to-day in the Sales Department.

W. J. Sandeman,
Distributing Engineer and Sales Manager.

Croydon Gas Company, May 13, 1921.

How Not to Advertise.

At a meeting of the Bradford Advertising Association, on Thursday last, under the chairmanship of Mr. A. Widd, Mr. C. E. Allsop, Publicity Manager for the Bradford Corporation Electricity Department, submitted a large selection of posters, booklets, leaflets, picture post-cards, bookmarks, and similar business-pushing matter for expert criticism by members of the Association, most of whom were concerned in publicity work as a profession. Mr. Allsop said it was admitted that the electricity industry, unlike the gas industry, was rather lacking in publicity and business-pushing matter. The British Commercial Gas Association served the gas industry excellently in this direction; and he wanted candid criticisms of Electrical Development Association matter so that it might help that body, which was only two years old, to improve its service to the industry. The meeting criticized each item in turn, pointing out that in several instances the publicity matter tended to "cry stinking fish" by drawing attention to eye-strain and other defects of the electric light generally in order to push the sale of shades and fittings. A pamphlet advertising the cleanliness of electricity showed a picture, on the front cover, of a beautiful country house, with a great factory chimney immediately behind it belching forth smoke; the theme of the pamphlet being "The Power Behind the Home," and the chimney representing the production of electricity for the home. A pamphlet advertising electric fans made the central feature of a picture of an electric fan and a great curving stream of flies, the text indicating that the fan was driving flies away, while the impression given by the picture was that the fan was attracting flies in droves.

Irish Gas Supplies.—In most of the Irish cities and towns, the shortage of coal has led to grave trouble in relation to gas supply. Public lighting has been suspended in Dublin and in the majority of the provincial centres. The Athlone Gas-Works are about to close-down; and at Nenagh (Tipperary) the gas supply is already shut-off. Industries suffer badly in both these towns; and in Athlone, as the town water supply is pumped by gas-engines, a water famine is threatened.

REGISTER OF PATENTS.

Gas Purifying Apparatus.—No. 139,758.

BOURDON, C., of Paris.

No. 4232; Feb. 11, 1920.

This invention refers to purifying apparatus adapted for use with gas containing solid matter in suspension, for the purpose of extracting the solid matter, either in cases where purified gas is needed or where the solid matter has a marketable value.

The apparatus comprises a fan device adapted to draw in the gases to be purified and to discharge them when purified—the apparatus being so contrived as to cause the segregation, by the action of centrifugal force, of the solid products which are carried into the fan device, and conducted to the outside by means of a conduit.

Separate Recovery of the Constituents of the Distillation Gas from Fuel.—No. 146,332.

BERGIUS, F., and KALNIN, P., of Salkenbergsweg, Essen-Ruhr, Germany.

No. 18,266; July 2, 1920. Convention date, Oct. 26, 1917.

This invention relates to a process for the recovery of ethylene from distillation gases, by first freeing them from their tar, ammonia, and benzene contents, by the usual methods, and then passing the residual portion of the gas mixture at a temperature within a particular range over a substance presenting a large superficial area.

Substances presenting a large superficial area have the property of exerting a highly selective action on the constituents remaining in the distillation gases after tar, ammonia, and benzene have been separated out—the temperature at which the gases are passed over the highly adsorbent substances playing, as is known, an important rôle and enabling the gas mixture to be separated into a plurality of components in which the various constituents are concentrated in varying degree by passing the mixture successively over a series of highly adsorbent substances kept at different temperatures.

The inventors utilize this property for the selective concentration of ethylene, by means of highly adsorbent materials, of which carbon is specially suitable for this purpose—a working temperature lying between 0° and −20° C. being employed. In order to obtain further concentration of the ethylene which has preferentially been concentrated from the gas mixture, the concentrated gases may be expelled from the adsorbent agent by heat, and thereupon passed again over a fresh quantity of adsorbent substance, which latter again preferentially selects from the gas the same constituent as was preferentially selected during the previous adsorption.

As regards the concentration of ethylene upon highly adsorbent carbon, the conditions are such that, at the above-mentioned working temperature there is first obtained from the natural mixture produced by distillation and which has only been freed from tar, ammonia, and benzene, a mixture which contains 17 p.ct. of ethylene, as compared with 1 to 2 p.ct. in the original gas mixture—and that this gas mixture containing 17 p.ct. of ethylene may be concentrated to 36 p.ct., and thereafter to 50 p.ct. of ethylene, by repeated adsorption by carbon at the same working temperature.

Photometers.—No. 153,323.

SIEMENS AND HALSKE AKTIENGESELLSCHAFT, of Siemensstadt, near Berlin.

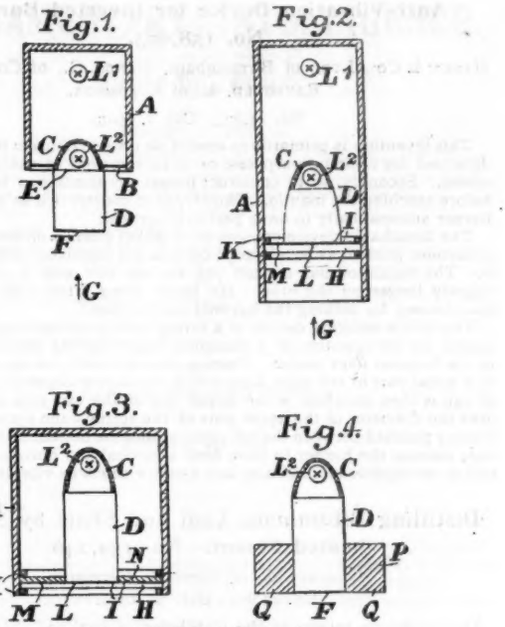
No. 30,637; Oct. 29, 1920.

In the photometer forming the subject of this invention the light of the light source to be measured, or of the standard source of light, is led to the surface of comparison through a transparent body, so constructed and arranged that the light rays are led into and out at the end surfaces of the body, and pass through the latter in the direction of its length so as to utilize the whole of the reflection at the whole of its side surface. This arrangement is said to have the advantage that the light source, whose rays are led through the transparent body, need have only a comparatively low intensity in order to produce a determined uniformed brightness on the surface of comparison. Further, the arrangement affords a compact construction of photometer because the two surfaces to be compared, which are illuminated respectively by the standard source of light and the source of light to be measured, can be arranged in a common plane, as illustrated diagrammatically in various constructional forms.

In fig. 1 (employed for comparing the light intensities of two lamps), the lamp L_1, whose light intensity is to be measured, is arranged in the back part of a light-tight cylindrical casing A which is shut-off in front by a dull plate B. In a central aperture of this plate is arranged a small light-tight hood C which projects into the casing and contains the standard lamp L_2. In front of the hood is attached a cylindrical glass body D in such a manner that the light from the lamp enters solely into this body through its front end E. The light is transmitted by total reflection from the sides of the glass body in the axial direction, so that it can pass out only at the opposite end F, which serves for observation purposes. The observation surface F is preferably dulled or provided with a cover of milk-glass. The manifold reflection in the interior of the body D effects a good mixing of the light rays, so that the surface F is uniformly illuminated.

The light of the lamp to be measured illuminates the plate B. In the direction G its brightness is compared with the brightness of the dull surface F. The adjustment for making the brightness of the two surfaces equal is effected in the usual way.

The two surfaces to be compared are in different planes in the construction shown in fig. 1; while in fig. 2 they are in the same plane—thus facilitating the comparison of the intensities of the two sources of light. The lamp to be measured is, in the photometer shown in fig. 2, arranged in the back part of a cylindrical casing open at its front end



and containing also the glass body D, which is preferably made somewhat conical in this case. To the rear end of it is connected the correspondingly conically-shaped hood C which encloses the standard lamp. In fig. 2, neither of the two end surfaces of the glass body D is dulled. In this case it is in contact at its front end surface with a separate glass plate H which is dulled at I on its rear side, or is provided with a covering of milk-glass. The plate is situated between rings K attached to the inner wall of the casing.

The circular middle portion of the dull surface is illuminated by the standard lamp L_2. The annular portion M of the dull surface I, which is between the rear ring K and the light-exit end of the glass body D, receives its light from the source of light to be measured. The two portions L and M can be compared together in the direction G.

The interposition of the transparent body D between the standard lamp and the glass plate affords also the advantage that a sharp delimitation is produced between the two surface portions L and M in so far as it obviates the formation, between these two surface portions, of a shadow that might be produced by the edge of the hood C upon the surface I if the glass body were absent. The suppression of this shadow allows of a safe comparison between the two surfaces.

In the forms shown in figs. 1 and 2, the source of light to be compared may be situated also inside the hood C that is connected to the glass body D, and the standard source of light may be arranged in the back part of the casing surrounding the hood. Each source of light may also have its own transparent body through which the rays of the sources of light are led to the respective surfaces of comparison.

The measurer of illumination in fig. 3 is (like that illustrated in fig. 1) provided with a cylindrical glass body D, to the rear end of which is connected the hood C containing the standard lamp L_2. The front end surface of the glass is, however, not dull, but—similarly to the arrangement shown in fig. 2—is in contact with a glass plate H, the back of which is dulled at I or is provided with a covering of milk-glass. The annular portion M of the surface I in the vicinity of the light-exit end of the glass body D is covered with an opaque white layer N, whose front surface is rough in order to reflect the light in an irregular manner in all directions. For the purpose of measuring the illumination on to the surface I, the brightness of the circular middle portion L of it, which is illuminated by the standard lamp, is varied until the entire surface appears equally bright at M and L.

Fig. 4 illustrates a simplified construction. In this case only the front end surface of the glass body D is dulled at F, or provided with a covering of milk-glass, without the provision of a separate glass plate in front. The front end of the glass body D extends through an opaque white mass P whose front surface Q is rough in order to reflect the light irregularly. This front surface is in the same plane as the surface F.

Inverted Gas-Burners.—No. 158,042.

BIRCH, G., of Manchester.

No. 25,726; Oct. 21, 1919.

This invention has for its object to provide baffling means adapted to reduce the passage between the mantle ring and the burner for the purpose of obstructing the upward flow of the heated gases and directing such gases on to the inner surface of the mantle.

In a previous construction of this type of device, a plate adapted to fit inside the mantle ring was provided with lugs which rested on the ring so as to support the plate—a hole being provided in the plate for the burner. But according to the present invention, the baffling means comprise a tubular member adapted to obstruct the upward passage of the heated gases between the nozzle and the mantle ring and to project into the mantle beyond the bottom surface of the ring so as to direct the gases on to the interior surface of the mantle. This is said to increase the efficiency of the light given by the mantle when incandescent and thus economize the gas consumed.

Anti-Vibration Device for Inverted Burners. No. 158,603.

Hands & Co., Ltd., of Birmingham, Hands, G., of Croydon, and Raybould, A., of Edgbaston.

No. 24,073; Oct. 2, 1919.

This invention is primarily to enable an inverted burner to be readily detached for cleaning purposes, or to be removed to connection elsewhere. Secondly, so to construct it that any shock can be absorbed before reaching the mantle. Thirdly, so to construct it as to cause the burner automatically to hang perfectly vertical.

The detachable device consists of a socket pierced on each side like a bayonet joint so as to telescope on to a gas regulator designed to fit it. The regulator has a plain peg on one side and a screwed peg slightly longer on the other; the latter being fitted with a running thumbscrew for locking the bayonet joint socket.

The shock-resisting device is a fitting with a screwed cup, properly seated for the insertion of a phosphor bronze spring into the bottom of the bayonet joint socket. Passing through both the cap and spring is a metal part or tail pipe, from which the burner depends. A washer or cap is then attached to the upper end of the tail pipe so as to lap over the diameter of the upper part of the spring—the spring thus becoming pinched between the tail pipe cap and the bottom of the screwed cup, causing the burner to have both a vertical and horizontal motion and to be capable of absorbing any average shock or vibration.

Distilling Bituminous Coal and Shale by Superheated Steam.—No. 159,246.

Gercke, M., of Nürnberg, Germany.

No. 25,655; Oct. 20, 1919.

This invention relates to the distillation of coal and shale by subjecting it to the direct action of superheated steam while it is continuously conveyed into and through a distilling chamber. The distillation process is facilitated by the raw bituminous material being preheated before it is subjected to the direct action of the superheated steam, preferably by being conveyed into the distilling chamber through a jacketed charging section adapted to be heated by the circulation of saturated steam.

Under a modification, the fuel while being conveyed is caused to pass through a heated oil-bath, preferably kept in continuous circulation, before being subjected to the action of the superheated steam in the distilling chamber. In this case the fuel may be steam-heated in the charging section, depending on the amount of water it contains. The oil acts as an external heating agent and drives off water and the more volatile constituents of the fuel. It then penetrates into the fuel, taking the place of these constituents; and in this state the fuel mass is distilled by superheated steam to obtain primary tar or coal oil. The oil-bath is formed in the lower part of the distilling chamber, the oil being circulated by means of a pump, through a heater which is heated by the waste gases from the steam boiler and also by the steam superheater used in carrying out the process.

The coal or shale may be conveyed uninterruptedly and in a positive manner by endless chains comprising articulated members or links formed with pistons which are maintained fluid-tight during their passage through the distilling chamber by labyrinth packings.

Hot Plates for Gas Cooking Stoves.—No. 160,504.

Helps, G., of Nuneaton.

No. 29,571, Oct. 5, 1918; No. 29,572, Nov. 23, 1918; No. 29,573, March 12, 1919.

The claims made for this "combined" invention are:

1. In hot plates for gas stoves, cookers, or the like, the combination, with a plurality of burners of one pattern, of means for controlling the supply of gas to the burners from the edge of the hot plate and means for supplying the burners remote from such edge with gas—such means consisting of long nipple tubes or auxiliary burner tubes.
2. In hot plates, as claimed in claim 1, means for adjusting the distance of the hot plate from the burners.
3. In hot plates, as claimed in claim 1, carrying the burners in stirrups.

Prepayment Gas-Meter Mechanism.—No. 160,514.

Hansford, John, and the Hansford Meter Company, Ltd., of Enfield.

No. 31,465; Dec. 16, 1919.

This invention relates to meter mechanism of the type in which the coin is inserted through a slot in a price-change disc. On the front of the actuating device in previous inventions of a similar type, the effective changes of disc can, it is said, only be adjusted to a limited portion of the circle; but one of the main objects of the present invention is to enable this to be done over the whole of the circle—thus giving a wider range of price than heretofore, without the removal of the change disc. A further object is the simplicity of the operating mechanism, which by the removal of a single screw allows the removal and renewal of defective parts (crown wheel, pawl-plate, spring pawl, and screw) while the meter is *in situ*.

Inverted Incandescent Gas-Burners.—No. 161,463.

Colbran, J. B., of Manor Park, E.

No. 14,076; May 21, 1920.

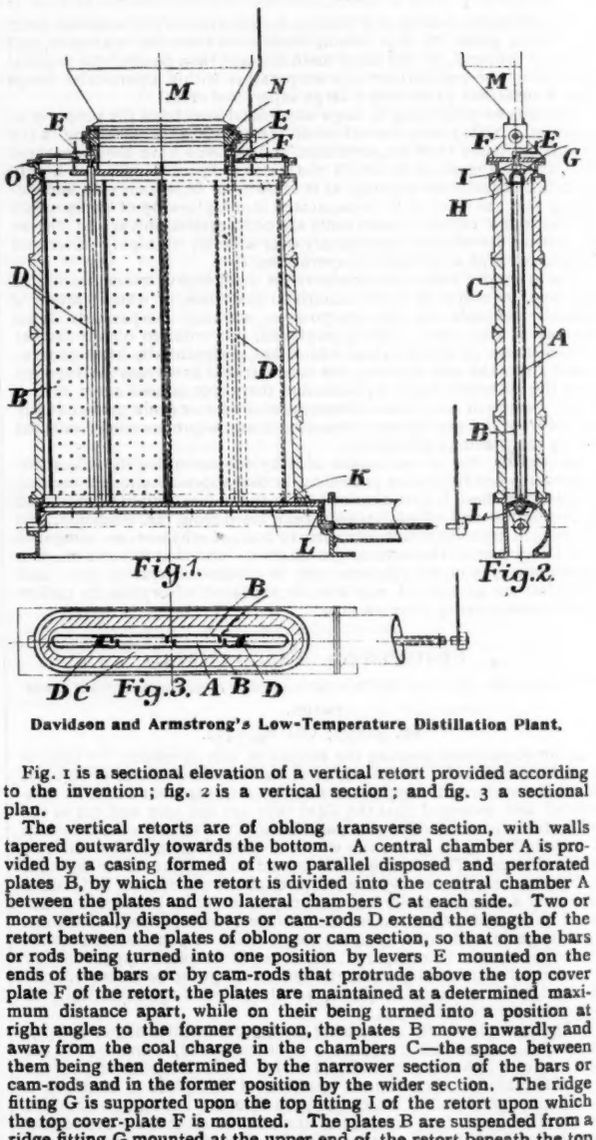
This invention relates to an intensifying chamber for superheating the gas and air mixture before it reaches the point of combustion, and refers to burners where such chamber is divided centrally and horizontally by a diaphragm against which the incoming gas mixture impinges and spreads; there being openings formed in the diaphragm through which the mixture in the upper half of the chamber passes, and entered (properly diffused) the lower half, where it is superheated before it flows to the burner. In the present instance the chamber is divided by a solid diaphragm having a number of peripheral slots forming "accurate" openings between the diaphragm and chamber wall, the slots being formed by cutting and bending tongues at right angles to the diaphragm, some upwards and some downwards, and which tongues may be secured to the wall of the chamber.

Low-Temperature Distillation.—No. 161,608.

Low-Temperature Carbonization, Ltd., Davidson, T. M., and Armstrong, H. L., of Cockspur Street, S.W.

No. 25,104; Oct. 14, 1919.

This invention relates to the distillation of coal under low-temperature conditions—up to about 750° C.; and it has among its objects to provide simple and effective means for discharging vertical retorts of the residue of distillation and to prevent the adherence of the charge within the retort as the result of its expansion in the course of the distillation, and to permit of its freely falling on the bottom doors being opened.



Davidson and Armstrong's Low-Temperature Distillation Plant.

Fig. 1 is a sectional elevation of a vertical retort provided according to the invention; fig. 2 is a vertical section; and fig. 3 a sectional plan.

The vertical retorts are of oblong transverse section, with walls tapered outwardly towards the bottom. A central chamber A is provided by a casing formed of two parallel disposed and perforated plates B, by which the retort is divided into the central chamber A between the plates and two lateral chambers C at each side. Two or more vertically disposed bars or cam-rods D extend the length of the retort between the plates of oblong or cam section, so that on the bars or rods being turned into one position by levers E mounted on the ends of the bars or by cam-rods that protrude above the top cover plate F of the retort, the plates are maintained at a determined maximum distance apart, while on their being turned into a position at right angles to the former position, the plates B move inwardly and away from the coal charge in the chambers C—the space between them being then determined by the narrower section of the bars or cam-rods and in the former position by the wider section. The ridge fitting G is supported upon the top fitting I of the retort upon which the top cover-plate F is mounted. The plates B are suspended from a ridge fitting G mounted at the upper end of the retort beneath the top cover-plate F in such a manner as to permit of their movement towards and away from each other as described. This is conveniently effected by a series of transversely disposed bolts H carried by downwardly extending walls of the ridge fitting, so that the plates may thus to a determined extent slide inwardly or outwardly upon the bolts H in the operation of the bars or cam-rods D, the lower ends of which may be guided by a boss cast on the bottom door casing between the two plates B to prevent their both moving too far in the same direction. Otherwise the lower ends are free, as also may be the lower ends of the bars or cam-rods.

Small quantities of steam may be admitted to the retort through the channel K in the bottom door L, through which water is passed which evaporates and thus serves the double purpose of keeping the bottom door cool and producing steam for admission to the retort. The steam passes through holes on the underside of the bottom door and ultimately into the retort along the sides of the door. The bottom door

is thus not intended to be gas-tight, as there is provided a gas-tight chamber below the retort to take the discharged residue.

In operation, the coal is distributed by means of a scraper conveyor into a hopper M above the retort (which hopper may be used as a measuring device to contain the proper amount of coal required to make a charge for the retorts), a rotary door N being provided between the hopper and the retort. By rotating this door by the handle provided, the coal charge is admitted into the retort from the hopper. Prior to this the casing within the retort formed by the perforated plates B may be opened to the full extent by means of the cam-rods D, so that the central chamber within the retort is opened to the full extent. Having charged the retort, the door between the hopper and the top of the retort is closed.

After a determined period, the levers E are turned a little, so as slightly to move the plates B inwardly. After a further period the levers are turned to a position 90° from their original position, so as to allow the plates to move further inwards towards each other and away from the charge. On the completion of the distillation the bottom door L is rotated to allow the charge to fall into a cooling receptacle below. The plates B are now cleaned by steel brushes passing through holes O in the top cover plate F and through corresponding holes in the ridge fitting G, and the plates are then set into their outermost positions again for receiving another charge.

Gas-Meters.—No. 161,480.

POCOCK, S. J., of Hamilton, Canada.

No. 18,341; July 3, 1920.

This invention relates more particularly to gas-meters of the class in which a wrist body is adjustably mounted in a tangent having spaced sides and an end cross member.

The primary object is to provide means for the regulation and adjustment of the position of the tangent wrist along the tangent by rotation of the screw-spindle in the usual way, without taking down the meter, as was formerly necessary, in order to increase the space between the centres of the tangent-wrist and the crank-shaft to cause the index to operate more slowly, or to decrease such space so as to cause the meter to operate faster. A further object is to provide means to permit the insertion of a key into the interior of the meter from without, whereby to rotate the screw-spindle without dismantling the meter.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for May 11.]

Nos. 12,468 to 13,086.

AASS, H.—"Cocks and valves." No. 12,738.
BAMBER, H. W.—"Gas producers or generators." No. 12,789.
BELDIMANO, A.—"Storing gases under pressure." No. 13,083.
BISMARCKHÜTTE.—"Separating water from coal tar." No. 12,974.
BISMARCKHÜTTE.—"Coking-chambers for generators." No. 12 975.
BLAIR, CAMPBELL, AND M'LEAN, LTD.—"Effecting intimate contact of liquids and gases." No. 12,873.
BOWDEN, W.—"Meter dials." No. 12,725.
BRADLEY, L.—"Distillation of tar, &c." No. 12,524.
BRYAN DONKIN COMPANY, LTD.—"Tar-cocks." No. 12 711.
DIAS, J.—"Economizer for gas-stoves, &c." No. 12,979.
DUCKHAM, Sir A. M.—"Carbonizing fuel in vertical retorts" No. 12,675.
FISHER, A.—"Distillation of coal, &c." No. 12,950.
GLOSSOP, W.—See Bradley. No. 12,524.
GLOVER AND Co., LTD., G.—"Prepayment gas-meters." No. 12,559.
HOPKINSON, P.—See Bryan Donkin. No 12,711.
KEITH, G., and KEITH AND BLACKMAN COMPANY, LTD.—"Means for controlling the supply of combustible mixture to internal combustion engines." No. 13,054.
KIRKE, P. ST. G.—"Water-gas plant." No. 12,889.
MASON, F.—"Combined boiler and retort, internally heated by gaseous fuel." No. 12,812.
MIDLAND COAL PRODUCTS, LTD.—See Fisher. No. 12,950.
MONTGOMERY, H.—See Fisher. No. 12,950.
NICHOLSON, H. G.—"Fluid-meters." No. 12,977.
NICHOLSON, V. R.—"Flow-meters." No. 12,976.
NICHOLSON, V. R.—"Fluid-meters." No. 12,977.
NORRIS, W. H. H.—"Process for recovering sodium sulphate and a liquor of high acidity from nitre-cake. No. 13,029.
PARKER, J. W.—See Bamber. No. 12,789.
RIGBY, T.—"Heat-regeneration systems of gas-producer plants, &c." No. 12,572.
RONEY, J.—"Globes, &c., for gas." No. 12,754.
STAPLES, C. W.—See Glover. No. 12,559.
STILL, W. J.—"Internal-combustion engines and gas-producers." No. 12,986.
SUGDEN, C.—"Apparatus for switching gas on or off." No. 12,727.
THOMPSON, T.—"Valves and valve boxes." No. 12,520.
WILLSDON, R. W.—See Bradley. No. 12,524.
WOODALL, DUCKHAM, & JONES (1920), LTD.—See Duckham. No. 12,675.

The Tottenham District Heat, Light, and Power Company have offered to provide a gas installation in the new houses (730) on the White Hart Lane estate of the London County Council, including all necessary piping, fixtures, and fittings for lighting and cooking, for an inclusive charge of £7 a house; the houses to be connected-up with the source of supply without further charge. The offer appears to the Housing Committee to be reasonable under present conditions, and the Minister of Health approves of its acceptance. The Committee recommended accordingly.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The further Standing Orders applicable to the following Bills have been complied with: Colne Corporation, St. Helens Corporation, Leicester Corporation, Harrogate Gas, and Burnley Corporation.

The Dundee Gas Order Confirmation Bill: Read the third time; passed; and sent to the Commons.

The Colne Corporation Bill, Harrogate Gas Bill, Leicester Corporation Bill, and the St. Helens Corporation Bill: Read a second time, and committed.

The Burnley Corporation Bill: Read a second time.

A petition has been deposited by the North Eastern Railway Company against the Harrogate Gas Bill.

HOUSE OF COMMONS.

Progress of Bills.

The Tendring Hundred Water and Gas Bill: Read the first time, and referred to the Examiners.

The Dundee Gas Order Confirmation Bill: Considered; read the third time; and passed without amendment.

A Bill to confirm a Provisional Order under the Burgh Police (Scotland) Act, 1892, relating to Hamilton Water and Gas was presented by Mr. Munro; read the first time; and referred to the Examiners.

The Wigan Corporation Bill: Reported with amendments from the Local Legislation Committee.

The Radcliffe and Little Lever Joint Board Gas Bill, as amended, considered; and to be read the third time.

Public Utility Companies (Capital Issues) Act, 1920.

A copy of a report was presented on an application to the Board of Trade under the Act by the Llantrissant and District Gas Company.

Gas Regulation Act, 1920.

A copy was presented of a draft of a Special Order proposed to be made by the Board of Trade under section 10 of the Act on the application of the Ossett Corporation.

The Gas-Mantle Industry as a Key Industry.

Sir J. NORTON GRIFFITHS (Central Wandsworth) speaking on behalf of the gas-mantle industry in the course of the debate on the Safeguarding Industries Bill, contended that this industry was necessary for the maintenance of the thorium trade in this country, and could therefore be classified as a key industry. He represented a constituency which was the home of the gas-mantle trade. Was it not intended, he asked, that the gas-mantle industry should form part and parcel of the group of key industries in connection with the use of thorium? There were some 4000 people depending upon this industry in Central Wandsworth. It was the home of a happy industry. They worked comparatively long hours, from morning till night. There was no ca' canny about their methods. They were mostly women, and had developed a very high pitch of efficiency; but, over and above that, goodwill and harmony prevailed throughout. He went into one set of works after another. Employer and employed were on the most excellent terms, and a happier crowd it was never his pleasure to see. What do they see to-day? A place virtually shut-down. He had received piles of post-cards. He had received deputations—not deputations prompted by the employers, but deputations which asked, "Cannot you help us to keep our trade?" He would not ask that the trade should be included among the key industries if he did not think that this was part and parcel of a key industry. There was the argument: "Why should we pay more for our gas-mantles?" That was not a question which affected the principle. If they once shut-down a gas-mantle factory in this country they would pay more for gas-mantles because there would be no competition, and the German ring would put up prices. He had seen protests from the Croydon Gas Company, the Gas Light and Coke Company, and the people associated with them, against the inclusion of gas-mantles. He pressed upon the Government the fact that these parties were not seeking the welfare of the people. They were neither Free Traders nor Tariff Reformers, but simply vested interests. They would, if they succeeded, keep out of employment 4000 men and women; so that a little gas-mantle factory which they owned in Belgium, which was Bosche before the war, and which they controlled to-day, might continue. He made his appeal to the Government, not because he was seeking votes, but on behalf of those who in the past were a happy and contented group of manufacturers and workers in the gas-mantle industry. On behalf of genuine British workers, he asked that if it was at all possible the gas-mantle industry should be included in the Bill.

Mr. KILEY said Sir J. Norton Griffiths had raised a matter of considerable importance to the people of Wandsworth. They had factories there in which they manufactured gas-mantles, and their grievance was that their supply of raw material was to be protected and was to become a key industry, while they, the manufacturers of the finished product, were to be exposed to competition. They complained that while the foreigner might not send in the material from which the mantle was made he was in a position to send the mantle.

Mr. G. BARNES said Sir J. Norton-Griffiths had put up a very plaintive appeal for 4000 people who had been engaged in the manufacture of gas-mantles, and a large number of whom were now unemployed because gas-mantles could not stand competition from other countries. The same argument that has been put up on behalf of gas-mantles could be put up, at all events with perhaps equal weight, on behalf of a great many other industries in the country. Gas-mantle making was not an industry which yielded a particularly high wage. Supposing that the gas-mantle industry in Central Wandsworth was closed-down,

they must get mantles from somewhere. There was only one way by which they could get them. They must pay for them by the production of other goods; and in the production of these other goods it was quite possible that some of the people who have been displaced in Central Wandsworth might find employment, while it was quite certain that other people would be employed under better conditions.

Mr. LORDEN said he had seen the gas-mantle industry in Wandsworth grow up. It grew from very small dimensions prior to the war; but during the war it grew to a position of considerable magnitude and importance to the country. He went to see the exhibition recently held on the Embankment, and saw gas-mantles there and all the etceteras belonging to the business offered at a price which did not enable people to live in this country at all, and gave them no opportunity. This industry would be in the same parlous state that it was in before unless something was done for it. He was inclined to think that the Government had made a mistake in not including such an industry as this, because from it flowed so many other things that were wanted during war time.

Mr. HANNON said he would like to support Sir J. Norton Griffiths' view, not because of the particular articles he cited, but because of the value of the gas-mantle in the conservation of the coal supply. The employment of the gas-mantle in the conservation of coal was equivalent to 32,000,000 tons a year as against the employment of the flat flame. The report of Lord Balfour of Burleigh's Committee stated that: "The manufacture of mantles was obviously of great importance, especially in respect of efficient illumination and the conservation of coal supply." He commended this to the consideration of the Parliamentary Secretary. During the first quarter of this year the country imported 150 p.ct. more gas-mantles than in the first quarter of last year, and 800 p.ct. more than in the first quarter of 1919; and meanwhile the works were on short time and the workers were either out of employment or were only engaged for a small number of hours per week.

Sir J. NORTON-GRIFFITHS, on Thursday last, presented a petition from several thousand electors of Wandsworth, Streatham, Mitcham, Battersea, Putney, Tooting, Westminster, Hornsey, Camberwell, St. Pancras, and many other places, praying that gas-mantles might again be included as a key industry under the Safeguarding of Key Industries Bill.

Desborough Housing Scheme and Gas Supply.

Mr. WATERSON asked the Minister of Health when he expected to settle the difficulty about gas in connection with the Desborough housing scheme; and whether he was aware that twelve houses were already let, and that all that was in dispute was the question of allowing gas to be laid in the houses from the main—the latter being less than 6 ft. away from the houses.

Sir A. MOND said he understood that the majority of the houses referred to could not be served by gas unless the existing main was extended. The gas company declined to extend the mains to these houses, or to those not yet completed, unless a gas-cooker was paid for by the authority and installed in every house, in addition to the coal cooking-range already provided. It was open to the company to let gas-cookers on hire to any of the tenants who desired them; and he was unable to agree that the additional capital cost of a gas-cooker should be incurred as a charge to the housing scheme.

WIGAN CORPORATION BILL.

This Bill has during the last fortnight been under consideration by Section B of the Local Legislation Committee of the House of Commons, presided over by Mr. E. GARDNER.

One or two clauses, contained in Part VI., deal with the construction and laying of gas-pipes. Clause 54 reads as follows:

(*a*) The Corporation may specify the size and material of the pipes, with the fittings thereof, which are to be laid by the consumer on his own premises either in the first instance or on the occasion of any renewal between the Corporation's mains and the meter, so far as such pipes and fittings are intended to be covered over.

(*b*) The Corporation may, if they think fit, make different specifications for different classes of premises, having regard to the probable maximum consumption of gas thereon at any one time.

(*c*) The specification shall be published once in each of two newspapers circulating within the limits of the Corporation for the supply of gas; and a copy thereof shall be exhibited in the office of the Corporation.

(*d*) Every meter to be used in a new building or a building not previously supplied with gas, or in connection with a new or substituted pipe laid by the consumer between the main and the consumer's meter, shall be placed as near as reasonably practicable to the Corporation's main, but within the outside wall of the building.

(*e*) When any such pipe or meter as aforesaid has been laid or placed, notice thereof shall be given to the Corporation; and the pipe shall not be covered over until after the expiration of twenty-four hours from the service of such notice on the Corporation. Any officer of the Corporation duly appointed may, between nine o'clock in the morning and five o'clock in the afternoon, attend and inspect such pipes (with their fittings) and meter; and if the officer is not permitted to make the inspection, or if the pipes or fittings are not according to the Corporation's specification, or if the meter is not placed as required by this section, the Corporation may refuse to supply gas to the premises until the provisions of this section have been complied with.

(*f*) Any person to whom the Corporation refuse a supply of gas under the provisions of this section may appeal to a Petty Sessional Court against such refusal; and the Court may, after hearing the parties and considering any questions as to the reasonableness of the Corporation's specification, make such order as seems to them proper in the circumstances, and may order by which of the parties the costs of and incident to the appeal shall be paid.

Clause 55 gives the Corporation power to supply premises in private streets, on the application of the owner or occupier, provided that they shall not unreasonably obstruct or interfere with the convenient access to any station or depôt of any railway company.

Under clause 66, power is given to fit up showrooms and offices and exhibit specimen installations, and give demonstrations as to the uses to which gas can be put.

No opposition was made to these provisions.

LEGAL INTELLIGENCE.

TAR FOR ROAD SPRAYING AND DAMAGE TO STREAMS.

A case lately heard in the High Court of Justice has decided that, although a local authority has power to tar-spray roads for the prevention of the dust nuisance, it is not protected if noxious matter from the roads gets into private streams and damages fish or watercress. This was the decision of Mr. Justice Salter in an action by Mrs. Dell, the owner of watercress beds at Chesham, Bucks, against Chesham Urban District Council.

Mr. Justice SALTER, in his reserved judgment last Friday, said the road in question was maintained by the defendants under the Local Government Act, 1888. The surface-water ran from the road into the watercress beds, and thence into the River Chess. There was considerable motor traffic on the road, which was tar-sprayed in May, 1919. Apparently no damage was done to the beds till the following November, when there was frost and snow, followed by thaw and rain, between the 11th and the 19th. Some of the watercress was then damaged and destroyed. Plaintiff claimed that the damage was caused by the surface drainage, which defendants denied; and, alternatively, they relied upon their powers under the Local Government Acts. Whereas plaintiff attributed the damage to the tar, defendants attributed it to the temperature of the water. Conflicting scientific evidence had been given in the case, which he did not consider it necessary to review; but reviewing the evidence of practical witnesses, he came to the conclusion that it did not bear out defendants' theory that, the road water being colder than the spring water which filled the beds, sudden chill had caused the damage. All the practical growers attributed the damage to the tar. Against this it was urged that if tar was the cause, the damage would have appeared earlier than it had done in this case. But it appeared that no harm was done so long as the tar on the road was hard and smooth, because the surface water then contained no appreciable quantity of acid dissolved from the tar. But when the tar was broken-up into particles by frost, and got mixed with water and churned-up, the water became full of acid. On this evidence, he found that the damage was done by the tar acid in the surface water. Defendants claimed that they had a right to do what they had done under sections 15, 16, 17 of the Local Government Act, 1875. But section 17 contained a restriction against the discharge of filthy and noxious water; and his lordship was of opinion that this water was noxious, and that the nuisance was prejudicial to public comfort, and even to some extent to public health. There was no doubt defendants had power to tar-spray the road; and if it were necessary to decide the point, he should hold that no action could be brought for damage which was the necessary consequence of the due and careful exercise of the power. But, however wide the power, defendants could not justify damage to plaintiff's property unless they could show that it was the necessary consequence of the exercise of the power or the discharge of a public duty. It was proved to his satisfaction that it was the necessary result of tar-spraying that the road water might in certain weather become dangerously charged with tar acid; but it was not shown to be a necessary result of tar-spraying this road that noxious matter must be discharged into the watercress beds. Defendants had not proved that the surface water could not be discharged directly into the river without passing through the beds. In these circumstances, plaintiff must have the injunction asked for, inquiry as to damages, and the costs of the action.

Mr. MACMORRAN, for defendants, objected to an injunction, and suggested the substitution of an undertaking not to continue the discharge, or a declaration.

It being stated for the plaintiff that she would be content with a declaration,

Mr. Justice SALTER substituted a declaration that defendants are not entitled to allow noxious water to flow or be discharged into the beds, with liberty to apply.

The Co-Partnership Exhibition Project.

A largely attended meeting was held last week at the Crystal Palace to further the project for an international exhibition to be held there in September and October, to demonstrate the success which has been attained in this and other countries in promoting industrial peace under conditions of co-partnership, profit-sharing, and other forms of welfare work. Mr. Henry James Buckland, who presided, said the Trustees who had charge of the Palace welcomed the proposal as one of supreme importance at the present time, and only required that efforts should be made to render the exhibition worthy of the great cause at stake and of the high traditions of the Palace. Among letters of approval read by Mr. E. O. Greening (the originator of the project) was one from Mr. D. Milne Watson, the Governor of the Gas Light and Coke Company. Representatives present from the South Metropolitan Gas Company, the South Suburban Gas Company, and other intending exhibitors, took part in a discussion for rendering the exhibition effective and popular. A further meeting is to be held in June; and meanwhile an Executive Committee is actively at work on the proposal.

MISCELLANEOUS NEWS.

FUEL EFFICIENCY AND THE USE OF COKE.

Tuesday evening last week was devoted by the Metropolitan Technical Branch of the National Association of Local Government Officers to a useful discussion, at the Caxton Hall, Westminster, of the all-important question of fuel efficiency. This was opened with a short paper, dealing with the matter with special reference to coke, by Mr. E. W. L. NICOL, Engineer and Fuel Expert to the London Coke Committee. Mr. J. REES occupied the chair.

Emphasis was laid by Mr. Nicol upon the absolute need for utilizing the country's coal resources in the best possible manner. He urged that coal consumption per unit of production must be reduced by adopting more efficient methods of use; and in order to help pay the inevitable increase in price, the valuable chemical products of coal must be recovered so far as possible before using it as fuel. The gain to the nation that would accrue from the carbonization of the coal now used in the raw state would not only enable a satisfactory standard of wages and profits in the mining industry to be established and maintained, but the smoke nuisance, with all its attendant evils, would also be abolished. Coal is no longer cheap enough to waste with impunity. It is now, indeed, a factor of prime importance in the cost of production; but there is no lack of evidence to prove that economies can be effected at once which in many cases should more than offset the increased price. An immediately available way in which output and revenue for a given coal consumption may be improved very materially lies through increasing fuel efficiency by promoting the rational use of coal, not as fuel, but as raw material for the manufacture of fuels—solid, liquid, and gaseous—each capable of being consumed smokelessly and possessing individually and collectively a much higher "availability" or efficiency than the coal from which they are produced by the process of carbonization. The net evaporative value of the solid and liquid fuels (coke and coal tar) so obtained from a ton of coal is, in fact, about equal to that of a ton of coal as ordinarily used. The value of the gas, amounting to about 12,000 c.ft., and also the recoverable benzole and ammonia, would thus be a clear gain to the nation. Essential public services and industries in London are at present being maintained to a very large extent on coke exclusively as fuel, and also by means of the Sandwich system of boiler firing, whereby the use of coal as fuel is reduced by more than half. One very noticeable result of this practice and of the present coal shortage is a marked improvement in London atmospheric conditions; the visibility over the Metropolis being better than it has been for several years past.

He went on to speak of boiler efficiency, and the various factors which this term includes—one of these being fuel efficiency, which may be described as its "availability," or capacity for being converted from potential energy into useful heat energy. This fuel efficiency, he said, has been proved capable of considerable improvement; and it was the possibility of effecting improvement and economy in fuel practice by this means that he proceeded to discuss. All fuels, he went on, whether solid, liquid, or gaseous, are not, of course, equally efficient; and by judicious blending, or mixing, either before or at the point of ignition, variable and advantageous results are obtainable. Ordinary non-coking bituminous coal containing 20 p.ct. to about 30 p.ct. of volatile matter is by far the most extensively used in this country as boiler fuel; but coking coal—probably the richest and most precious kind of coal obtainable—is often considered necessary for use with certain types of mechanical stokers. The large extent to which good coking coal is employed directly as fuel is probably the most lamentable feature of the prodigal wastage of our coal resources. The metallurgical coke produced by carbonizing this class of coal is absolutely essential in the iron and steel industries, which are truly said to be the very foundation of most other industries. There is no substitute for coke of this description; and, according to one authority, our resources of coking coal in this country are relatively insignificant when compared with those of other countries, and amount to only one-fifth of the total coal resources. Its direct employment as fuel for steam-raising is strongly to be condemned; and in the general interest of the nation, steps should be taken to conserve this class of coal and to prohibit its use except for carbonization and bye-product recovery purposes.

Mr. Nicol then pointed out the inherent defects of coal as a boiler fuel, dealt with the qualities of anthracitic coals and anthracite, and afterwards briefly gave his views upon coke. Probably the chief distinction between coal and coke, he said, is the almost entire lack of volatile matter and the porous physical structure of the latter, which qualities enable it to be consumed in a single stage and at a high temperature directly to carbon dioxide. Chemically considered, coke consists of carbon, together with all the mineral constituents contained in the coal from which it is made. It contains only a trace of hydrogen. The amount of carbon varies from about 85 to 95 p.ct., and the ash from 5 to about 15 p.ct. Fired under correct conditions of balanced draught, the formation of carbon monoxide gas can largely be avoided. The admission to the furnace of secondary air is therefore unnecessary; and this fact permits of the minimum of suction or chimney draught being maintained over the fire—the whole of the air necessary for combustion being forced through the fuel-bed. The inleakage of air through faulty boiler brickwork and economizer settings, and also the bye-passing or short-circuiting of hot gases, may thus be reduced to the minimum. With coke fired on these lines experience has proved that efficient combustion and a high calorific intensity are much easier to secure than in the case of coal firing.

Coal, coke, and gas are, in fact, related to each other much in the same way as ice, water, and steam. Judged by its analysis, coke should not have a calorific intensity superior to coal, such as it possesses, as evidenced by the fact that it is used for metal melting and other high-temperature processes. The explanation probably is that the process of combustion being already far advanced by the heat-absorbing process of carbonization, less heat is required to gasify it than is necessary in the case of coal. There is also a marked difference in the specific heats of coal and coke. Coke does not have the chilling effect of fresh coal when thrown upon an incandescent fire, and, being almost entirely free from hydrogen, it burns without the formation of water.

The foregoing conclusions tend to prove the importance of fuel efficiency as a factor bearing not only upon thermal efficiency, but also upon the commercial efficiency of steam plant operation. The purchase of fuel at so much per ton, without due regard to its relative efficiency, is a custom that must be superseded, in view of the growing importance of fuel as a factor in the cost of production. The calorific power basis of fuel purchase has many advocates; but though the calorific power, as determined by the calorimeter or by proximate analysis, may be a useful basis of comparison between fuels possessing similar characteristics, this basis is in itself no complete criterion. The possibility of improving the efficiency of combustion of rich bituminous coal by blending or diluting it with a non-volatile fuel, such as coke, has already been demonstrated on a large scale by the introduction of the "Sandwich" system of fuel blending at several important power stations. By means of this system, the proportion of volatile matter in the combined fuel as fired is reduced to the minimum consistent with the draught and other conditions. The proximate analysis of the mixture can be made to resemble that of our most efficient coal fuels, while the mixture is capable of infinite variation to suit conditions of load or, for commercial considerations, according to the prices for the time being of the various constituent fuels.

Being called upon to open the discussion, Mrs. Cloudesley Brereton addressed the meeting from the point of view of the economist. This fuel problem, she declared, must be faced as a national problem; for Britain and the British Empire are comparatively poor in coal. It was essential properly to utilize the coal after it was won, in order to compensate for the much greater cost of winning English coal than (say) American. It had also to be remembered that the kind of coal we could import was not always the sort that was needed for certain important industries. Mr. Nicol had pointed out that about one-fifth only of the coal of Britain was of the kind which would serve the vital iron and steel industries of the country. What must be done was to try and develop a national coal conscience.

The next speaker was Mr. R. C. Macdonald (Chief Mechanical Engineer to the South Metropolitan Gas Company), who explained the system adopted by his Company (at the instigation of the Chief Engineer, Mr. G. M. Gill) for the training of boiler firemen, as explained by him in his recent paper to the London and Southern District Junior Gas Association. He said that, in the South Metropolitan Gas Company, they had had a good deal of experience with the utilization of a very low-quality fuel—that was, the dust from coke which nobody else would have anything to do with. Now this material was a very valuable fuel for raising steam, though one required to have a fairly large boiler plant in order to meet demands, as the output was, of course, a good deal lower than a higher grade fuel would give. During the war they had to put up with all sorts of boiler stokers; while previous to that he did not think much attention was given to the economical use of such fuel, because it was a drug on the market. But with the new labour problems that faced them during and after the war, they found it necessary to take steps to secure the very best possible efficiency from this fuel, not only from the fact of its increasing value, but also because they were confronted with the need for a large expenditure in adding to their boiler plants. It was therefore decided to start an efficiency campaign in connection with this portion of their apparatus; and Mr. Andrews was appointed their Fuel Expert. The first thing that gentleman did was to train the boiler firemen. This was one of the most important things with regard to boiler firing—particularly when one had a fuel which could not be dealt with satisfactorily on a mechanical stoker, owing to its effect as an abrasive. A school was started, and every stoker in the Company had to undergo possibly two weeks' training. The results of this procedure were very gratifying. The Company had also had some experience of firing marine boilers with coke; and there, again, they had trouble with the method of stoking, while the same satisfactory results attended training. Several industrial concerns in their district had allowed the Company to give them a trial of coke instead of coal; and he thought that in every single instance they had been at least able to equal coal, and only in one case had they not been able to show a better evaporation with coke than with coal. Only that day he had heard that probably one of the biggest railway companies that ran into London had been experimenting with some of their locomotives, and had arrived at the opinion that coal would never again have the same standing in working their trains as it had had in the past. Possibly they would develop more on the lines of using coke, with the alternative of oil—a lot of which was obtained in the distillation of coal. If the paper did nothing else than stimulate interest in the question of using coal in a civilized manner, the time which Mr. Nicol must have devoted to its preparation would not have been spent in vain.

Various members of the Association then asked questions, or related practical experiences of one kind and another. Mr. L. J. J. Murfin (of the Metropolitan Asylums Board) remarked that the fuel they burned had got to have some relation to the money they spent. So far as his experience of coke was concerned, it must be admitted that only in about three of the institutions had they been able to burn it exclusively; but there it had been very successful. Taken over a period of twelve months, the average evaporation obtained with coke was 8 to 8½ lbs. With coal, the average over a similar period was 7½ lbs. per pound of coal. Mr. W. Sumner said it seemed to him that if they could burn coke combined with oil, it would be an ideal arrangement. From an economic point of view, had the gas companies considered the utilization of the products which arose when they were cooling their coke? Mr. J. S. Cargill thought they could get very nearly as much use out of economizers with coke as with coal. He asked whether it was possible to pulverize coke for use in cement works, as with pulverized coal the gases created a difficulty; and also whether forced draught could be utilized with coke, in order to increase the consumption per square foot of grate area. Mr. J. West inquired whether the sulphur from the coke interfered with the econo-

mizer tubes; and Mr. P. J. Cooper asked why coke varied so much in weight. Mr. J. Day said that with the "Sandwich" system he got just about the same evaporation as with coal alone. Mr. Watkins would be glad if something could be done to reduce the moisture in coke.

In the course of his reply to these and other speakers, Mr. Nicol remarked that Mrs. Cloudesley Brereton had suggested the necessity for cultivating a "coal conscience." She had been working for many years to create such a conscience, and he had done something in the same direction himself; but, to judge by the discussion that night, it did not appear that they had made much headway. [Laughter.] In view of the actual results attained, there could be no doubt whatever about the economic value of coke. As to the use of oil in conjunction with coke, this had been done for years past, but not because the coke required the oil. It was to meet sudden big demands for steam and overloads that could not possibly be met by coke alone or by coal alone. This was being developed to some extent to-day. One very seldom found an economizer in gas-works where the boilers were fired with coke. It was not wanted. Coke in pulverized form had been tried for firing cement kilns. However, the cost of pulverizing coke was considerably more than for coal. There was no material advantage in it; and the practice was abandoned. The effect of coke on economizer tubes was no different from any other fuel. He knew of no insurance company having taken exception to the use of coke either because of its effect on boiler plates or economizer tubes. Where the "Sandwich" system was in use on proper lines, its success was undoubted. He would be glad if anyone could assist him in getting the moisture out of coke. Steps were being taken to improve the quenching system, so that it would not be overdone; and at the same time the risk of fire would be eliminated. As it was, serious fires did occur at gas-works through the insufficient quenching of the coke.

Hearty votes of thanks were passed to Mr. Nicol and Mrs. Cloudesley Brereton.

THE REDHILL GAS COMPANY TO PURCHASE THE REIGATE GAS UNDERTAKING.

An Extraordinary General Meeting of the Redhill Gas Company was held last Wednesday—Mr. W. Lees Stenning, J.P., in the chair—for the purpose of: (1) Considering and, if thought fit, confirming an agreement to purchase the undertaking of the Reigate Gas Company, Ltd. (2) Considering and, if thought fit, approving an application to the Board of Trade for a Special Order under section 10 of the Gas Regulation Act, 1920, for, among other matters, enabling the Company to acquire the undertaking of the Reigate Company and to raise additional stock and loan capital. (3) Authorizing the raising of a sum not exceeding £52,250 17s. 4d. by the creation and issue from time to time of redeemable or irredeemable debenture stock to a nominal amount not exceeding £90,193 6s. 5d., under the authority of the Public Utility Companies (Capital Issues) Act, 1920, and the Redhill Gas Company (Capital Issues) Consent, 1921.

The Chairman said, in regard to the arrangement with the Reigate Company, both Boards of Directors had felt for some considerable time that a fusion of interests was desirable, and after prolonged negotiations they had arrived at an arrangement which was considered equitable to the proprietors of both Companies, and which would be beneficial to the whole community. This was an age of amalgamations; and Parliament recognized the desirability of smaller gas undertakings being absorbed by larger neighbours, when they gave the Board of Trade powers in the Gas Regulation Act of last year to authorize such a scheme as they were asking the meeting to formally approve. Looking at the map, it would be seen how small an area was served by the Reigate Company; and it was entirely surrounded by the district already supplied by the Redhill Company. Not only did they supply gas all round Reigate, but their mains actually passed through the western part of the borough itself. This alone would form reasonable ground for amalgamation; but when it was pointed out that the Reigate Company lacked the statutory powers which Redhill possessed, the case was immensely strengthened. From the stockholders' point of view, they were convinced that the larger output by one undertaking must make for improved results, both in manufacture and management. The benefit to the public would be a uniform price regulated by the sliding-scale fixed by the Board of Trade throughout the borough (instead of the price being higher by 6d. per 1000 c.ft. in Reigate, as it was at present), uniformity of quality, and, within three years, one centre of manufacture only for the whole district. The terms arranged between the two Companies provided that in exchange for the £25,000 of called-up capital in the Reigate Company, they would issue to the stockholders sufficient 6 p.ct. preference stock to yield approximately the same dividend as they were at present receiving. They also agreed to compensate the Directors and Managing-Director for loss of office, and take over all stocks of coal, residuals, and new stores, at market price. The reserve fund of the Reigate Company, which consisted of profits earned but undivided by them, remained the property of that Company. The Reigate Company would discharge the whole of their liabilities up to the date of the transfer. Provision was made in the agreement for their taking over the officers of the Company; and they had no thoughts or intentions of discharging any of the employees of the Reigate Company. The application to the Board of Trade repeated the terms contained in the agreement with the Reigate Company; and it asked for alterations to their existing Acts with regard to capital powers and other matters. Their Solicitor would read the agreement, and also explain the additional clauses in their draft application to the Board of Trade. Before doing this, however, he (the Chairman) wished to say a few words regarding the issue of debenture stock, as to the necessity of which he went into considerable detail at the annual meeting last February. The Board of Trade had now sanctioned the increase of borrowing powers from one-third to one-half of the amount of the issued capital; and the Directors asked the proprietors' approval to the issue of debenture stock as and when the Directors thought fit. A considerable amount was required at once to repay their indebtedness to their bankers, which had been increased owing to the necessity of carrying very large stocks of coal, and all other raw materials, to meet emergencies like the present, and also owing to the greatly increased capital required in the carrying-on of business at the present time. There was no intention of saddling the undertaking permanently with capital at such a high rate of interest as was necessary to-day; and they would therefore issue stock redeemable in a short period, when it was hoped that money would be cheaper. He was pleased to tell them that the agreement with the Reigate Company had that day been approved by the Reigate stockholders; and the Redhill Board had received proxies in favour of the proposals now before the meeting from an overwhelming proportion of their own stockholders.

The Solicitor (Mr. H. Ackland Hood) then read clauses of the agreement with the Reigate Company, dated April 15, which was conditional upon the approval of the two Companies and, of course, upon the Order being obtained from the Board of Trade. The agreement provided that the Reigate Company agreed to sell the whole of their undertaking for the consideration mentioned by the Chairman. The first consideration was in respect to the stock in hand, which was put at the net cost price for everything in hand (other than coke, tar, ammoniacal liquor, sulphate of ammonia, and other residual products) at the date of transfer. The market value on the date of the transfer, as between two wholesale dealers, was to be paid for all the residuals—the total sum to be agreed between Mr. W. H. Bennett, their Managing-Director, on behalf of the Company, and Mr. T. Charles, well known to them all, on behalf of the Reigate Company, or by some other competent gentleman. The Company were to issue stock to the holders of shares and stock in the Reigate Company in the following proportions: To holders of stock in the Reigate Company the nominal amount of £2 2s. 6d. of their new 6 p.ct. cumulative preference stock for each £1; and the nominal amount of £10 12s. 6d. of the stock for each share in the Reigate Company. They were to pay £3200 in cash to the Reigate Company, which that Company would apply in compensation to their Directors and Managing-Director for loss of office; and they would distribute the money as they thought fit. Full voting powers at all general meetings of the Company would be conferred upon the holders of the new 6 p.ct. preference stock. There was a provision that the Reigate Company should pay all outgoings up to the date of transfer; and that the Company should take over the Engineer and Secretary of the Reigate Company.

Mr. Hood then explained the provisions of the Special Order for which application was being made to the Board of Trade. Among other matters dealt with was that the Redhill Company were empowered to continue the manufacture of gas, and dealing in residual products on the site of the Reigate Gas-Works, and afterwards to use the site for the purpose of storing gas and residual products; but at the expiration of three years the powers to manufacture ceased. Another clause enabled the Company to acquire further lands by agreement—not exceeding 5 acres. There were clauses relating to the acquisition of houses, cottages, and buildings for the employees of the Company, or for show-rooms; the conferring of powers on the Directors to determine the remuneration of the Secretary; to enable the Company to make provision by gratuities, pensions, or otherwise to an employee, his widow or family, and to subscribe to charities and other local institutions. The financial provisions enabled the Company, in addition to the capital already authorized and the preference stock to be issued to the Reigate Company in connection with the purchase, to raise further sums not exceeding £200,000, by the creation and issue of ordinary stock or cumulative preference stock, and to borrow a sum not exceeding one-half the total amount raised by the issue of such last-mentioned stock, and, further, to borrow in respect of the old ordinary stock and the stock to be issued to the Reigate Company such a sum as (including the amount already raised) would not exceed £116,500. Other financial provisions were dealt with in some detail.

The Chairman then formally moved a resolution approving and confirming the agreement and also the application to the Board of Trade for a Special Order.

Mr. Cyril G. Davis, in seconding the motion, said they were aware that prices to-day were exceedingly high; and anything that could be done to reduce costs was a step in the right direction. He had had some experience of the amalgamation of large companies with powerful competitors; and the result had been most satisfactory—they had produced more cheaply, and had increased the efficiency of their goods. He was convinced the Directors took a wise step in approaching Reigate; and he thought the result would be satisfactory to the shareholders of both Companies. He was of opinion that efficiency would be increased and costs would be reduced.

The motion was carried unanimously.

The Chairman moved a resolution authorizing the raising of the redeemable or irredeemable debenture stock previously referred to. They had obtained the consent of the Board of Trade, and simply asked the shareholders to sanction the issue from time to time of such an amount as they might require.

Mr. A. W. Oke seconded the resolution; expressing the hope that the Directors would have the courage to issue the stock at 7 p.ct., so that the "man in the street" could see at a glance what he would get.

The motion was carried unanimously; and the meeting closed with a vote of thanks to the Chairman.

Bath Gas Curfew.—Gas rationing was to begin in Bath last Monday. The supply to be provided was announced as follows: Two hours for breakfast, two-and-a-half hours for dinner, an hour-and-a-half for tea, and an hour-and-a-half at night, with a curfew at eleven.

The Hackney Triple Gas Fatality.—At the inquest on the bodies of the husband, wife, and baby who died from coal-gas poisoning at a baker's shop in Morning Lane, Hackney, in circumstances mentioned in last week's "Journal" [p. 340], the Jury found that the cause was a defective gas-meter—a fissure having been found in the meter, from which the gas had escaped and filled the premises. Mr. T. V. Fenn, of the Gas Light and Coke Company, attributed the fissure to the great vibration caused by the heavy traffic along the street.

ROTHERHAM GAS REPORT.

A Record Year.

Mr. J. S. Naylor, Engineer and General Manager of the Rotherham Corporation Gas-Works, in his report for the year ended March 31, says the quantity of coal carbonized was 18,307 tons, at a cost of £30,509, or 33s. 4d. per ton, as against 23,113 tons the previous year, costing £30,641, or 26s. 6d. per ton.

The gas made was 248,065,000 c.ft., as against 301,004,000 c.ft., being a decrease of 52,939,000 c.ft. This decrease is accounted for by the increased supply of coke-oven gas from Messrs. John Brown & Co., Ltd., Canklow. The quantity received was 72,144,000 c.ft., equivalent to 22·38 p.ct. of the total gas delivered. The gas made per ton of coal carbonized was 13,550 c.ft., as against 13,023 c.ft., an increase of 527 c.ft. per ton. The quantity of gas sold was 291,252,000 c.ft., an increase of 2,411,000 c.ft. The unaccounted-for gas was 8·31 p.ct. of the make, as against 11·25 p.ct., a decrease of 2·94 p.ct. The balance due to the bank on March 31 was £5038, as compared with £322 in the bank a year ago. The amount of gross profit is £19 588, being an increase of £9103, and a record for the department. The net profit, after allowing for interest, redemption instalments, and contributions to the sinking fund, amounts to £8588, against £401, an increase of £8188. This also constitutes a record for the department. If the gas for public lighting (£3256) is again given by the department, as in former years, there remains a surplus of £5333.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" of applications by gas undertakings to the Board of Trade for Orders under the Gas Regulation Act.

Swaffham Gas Light and Coke Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. 6d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 7·5d. per therm.

York Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 2s. 3d. per 1000 c.ft. for gas supplied by them within so much of their limits of supply as is confined within a radius of two miles from the centre of Ouse Bridge, in the City of York, and such parts of the city as for the time being may extend beyond that radius (hereinafter referred to as the inner area); and they are authorized to charge for gas supplied by them within their limits of supply beyond the inner area a price exceeding by not more than 6d. per 1000 c.ft. the price for the time being charged for gas supplied by them within the inner area. The price they have asked the Board of Trade to substitute for the standard price of 2s. 3d. per 1000 c.ft. is 16·7d. per therm; and they have also asked the Board of Trade to substitute 1·2d. per therm for the said sum of 6d. per 1000 c.ft.

DECLARATION OF CALORIFIC POWER.

Great Yarmouth Gas Company.—480 B.Th.U. (June 20).

SPECIAL ORDER.

Thurstonland Urban District Council.

The Council are applying to the Board of Trade for a Special Order to enable them to construct gas-works upon land scheduled, and to supply gas within their district.

GAS REGULATION ACT ORDERS.

Copies have been received from the Director of Gas Administration, Board of Trade, of the following further Orders made under section 1 of the Gas Regulation Act. The parts applying specially to the Companies named, and the date of coming into operation, are noted.

Brighton and Hove General Gas Company.

After the declared date,

(*a*) The standard price in respect of gas supplied by the undertakers shall be 15·2d. per therm.

(*b*) The sums of three-fifths of one penny per therm, one-and-one-fifth pence per therm, two-and-two-fifths pence per therm, and three pence per therm respectively shall be substituted for the sums of 3d., 6d., 1s., and 1s. 3d. per 1000 c.ft. mentioned in sub-section (2) of section 18 of the Brighton and Hove Gas Act, 1910.

(*c*) The sum of 3d. per therm shall be substituted for the sum of 1s. 3d. per 1000 c.ft. mentioned in sub-section (1) of section 4 of the Brighton and Hove Gas Act, 1915.

For the purpose of ascertaining the authorized rate of dividend for the half year in which the declared date occurs, the price charged per 1000 c.ft. during that part of the half year (if any) before the declared date shall be rendered into the equivalent price per therm by dividing it by four-and-one-half.

The undertakers may demand in respect of gas supplied through a prepayment meter a not greater charge than in respect of gas supplied to private consumers within their limits of supply through any other kind of meter or by any other method of supply.

The charge for the hire of any prepayment meter and fittings to be used therewith shall be a sum of money calculated according to the

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number of therms supplied; and the maximum rate of charge shall be, for a prepayment meter and fittings (including a cooking-stove), 3·6d. per therm; for a prepayment meter and fittings (not including a cooking stove), 3d. per therm.

The maximum charge for the hire of a prepayment meter without fittings shall be at the rate of 10 p.ct. per annum on the cost of the meter.

The said charges shall include the providing, letting, fixing, repairing, and maintenance of the meter and fittings or of the meter (as the case may be), and the cost of collection and other costs incurred by the undertakers in connection therewith. (May 10.)

Wandsworth, Wimbledon, and Epsom District Gas Company.

After the declared date, the standard prices in respect of gas supplied by the undertakers shall be 16 6d. per therm and 14·6d. per therm; and these prices respectively shall be substituted for the prices of 4s. and 3s. 2d. per 1000 c.ft. mentioned in the first paragraph of section 55 of the Wandsworth, Wimbledon, and Epsom District Gas Act, 1912.

For the purpose of ascertaining the authorized rate of dividend for the half year in which the declared date occurs, the price charged per 1000 c.ft. during that part of the half year (if any) before the declared date shall be rendered into the equivalent price per therm by dividing it by four-and-three-quarters.

For the purpose of ascertaining the price per therm chargeable by the undertakers in the Wimbledon limits and the Epsom limits respectively, as defined in the Act of 1912, the additional prices per 1000 c.ft. charged in those limits at the date of this Order in pursuance of the proviso to section 55 of the Act of 1912 shall be rendered into the equivalent prices per therm by dividing them by four-and-three-quarters to the nearest fraction of a fifth of a penny.

This provision shall cease to have effect as from the taking of the meter indices in respect of the quarter commencing at Midsummer or Christmas next after the passing of the Bill now pending in Parliament intituled the "Wandsworth, Wimbledon, and Epsom District Gas Bill."

The following provisions shall be substituted for the first paragraph of sub-section (2) of section 56 of the Act of 1912: The charge for the hire of any prepayment meter and fittings to be used therewith shall be a sum of money calculated according to the number of therms supplied; and the maximum rate of charge shall be, for a prepayment meter and fittings (including a cooking stove), 3·6d. per therm; for a prepayment meter and fittings (not including a cooking stove), 3d. per therm.

The following provisions shall be substituted for sub-section (3) of that section: The charge for the hire of a prepayment meter without fittings shall be either a sum of money calculated according to the number of therms supplied (when the maximum rate of charge shall be 1·8d. per therm) or at the rate of 10 p.ct. per annum on the cost of the meter, whichever shall be the higher. (May 9.)

COALOWNERS' WAGES OFFER.

Figures Worth Preserving.

This is a revised list of figures, showing the wages per shift that the Miners' Federation have refused for the workers in the industry. It is issued by the Mining Association:

South Wales: Colliers (piece rates), 20s. 5d.; colliers (day rates), 16s.; labourers, 11s. 9d.

Scotland: Coal getters (piecework), 19s. 6d.; surface labourers (lowest rate), 10s.

Northumberland: Coal hewers, 20s.; underground day wage men, 10s. 9d. to 12s. 9d.; surface day wage men, 10s. 7d. to 12s. 4d.

Notts and Derby: Coal getters (piecework), 19s. 6d.; day wage men (adult), 11s. 7d. to 16s.; surface day wage men, 11s. 6d. to 12s. 8d.

North Staffs: Coal getters (piecework), 13s. 6d.; labourers on surface (lowest rate), 9s. 7d.

Forest of Dean: Coal getters (piecework), 18s. 4d.; surface labourers (lowest rate), 9s. 10d.

North Wales: Coal getters (piecework), 15s.; surface labourers (lowest rate), 10s.

Somerset: Coal getters (piecework), 15s.; surface labourers, 9s. 3d.

Durham: Coal getters (piecework), 16s. 6d.; day wage men, 10s. to 11s. 6d.; surface day wage men, 10s. 9d. to 11s. 2d.

Cumberland: Coal getters (piecework), 22s. 6d.; underground day wage men, 11s. 3d. to 15s. 4d.; surface day wage men, 11s. 3d. to 12s. 4d.

Lancashire: Coal getters (piecework), 17s.; day wage colliers, 15s. 1d.; day wage men (lowest rate), 11s. 3d.; surface workers, 11s. 1d. to 12s. 5d.; surface labourers, 10s.

The Littlehampton Gas Company have booked a cargo of 300 tons of Belgian coal, which is expected to cost 78s. 6d. a ton by the time it reaches the works.

The competition of the Luton and District Private Fire Brigades' Association took place on Saturday, the 7th inst., when the Davis Gas-Stove Company's brigade, who have already won many laurels, were successful in carrying-off not only the Challenge Cup (which took with it special prizes for the captain and reserve men of the winning team), but also a special prize for the neatest, and one of the fastest, drill, of the competing brigades. In addition, the Davis team secured two prizes for the two-man drill, three for the three-man drill, and five for the five-man drill—truly a creditable performance! Much sporting rivalry was to be observed between the Davis brigade and that of Messrs. Geo. Kent, who were the victors in the only events—namely, the one-man drill and the four-man drill—in which the Davis team were not successful.

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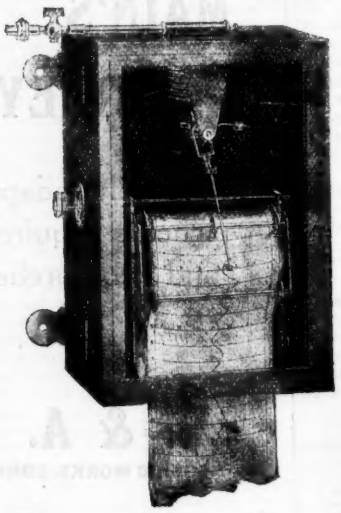
TAPE CHART PATTERN

For Pressure or Vacuum.

NO LIQUIDS USED.

The chart roll is renewed 6 times a year.



The record can be torn off at any interval.

Lowest Range: 0-2 inches water.

Highest Range: 0-300 lbs. per sq. inch.

Suitable for Gas, Air, Water, or Steam, and may be used on Crude Gas.

MAKERS:

ALEXANDER WRIGHT & Co., Ltd., WESTMINSTER

COST OF PRODUCING COAL.

Staggering Increases Pointed Out by Dr. Bone.

The following letter on the coal situation, written by Dr. William A. Bone, F.R.S. (dated May 10), appeared last week in the "Daily Telegraph."

There is a considerable danger of the public thinking that, if only the miners would agree to resume work on the terms suggested by the Government, the coal question might be regarded as settled for some time to come. It should, however, be pointed out that such a view is likely to prove a delusion, for the following reasons: For some time prior to the strike the cost of producing coal at the pit-head had exceeded its selling price by several shillings per ton. The difference had been made up to the coalowners by a subsidy from the public funds. The present crisis was precipitated by the decision of the Government that, after March 31 last, this subsidy must cease, and that the coal industry must revert to its former position of being self-supporting. Inasmuch as "wages" constitute practically 75 p.ct. of the cost of producing coal, it was clear that the industry could not become self-supporting again unless the wages paid per ton of coal raised were materially reduced. The reductions proposed by the coalowners, and to all intents and purposes by the Government also, were on a scale just (but no more than) sufficient to wipe-out the difference between the average cost of production and selling price at the pit-head, which had up to March 31 last been covered by the subsidy. It is important for us to realize that they did not contemplate, or aim at, any reduction in the selling price of coal at the pit-head, or, in other words, its cost to the consumer.

Now, it is patent to everyone who is tolerably well acquainted with the economic situation generally in this country, as well as with coal costs and prices in the United States, that our great manufacturing industries cannot be carried on with coal at anything like the prices that have been ruling since the armistice. In support of this contention, I need only cite the recent weighty declaration of Sir Hugh Bell (the President of the Cleveland Mineowners' Association) and my relative, Mr. Alfred Hutchinson (as President of the Cleveland Ironmasters' Association), to the effect that, if even the differences in the coal trade were to be settled now, there could be no resumption of work in the iron and steel industry on the old scale without a very drastic reduction in coal prices. Wages, they said, are governed by a sliding-scale; but even when wages have been reduced to bed-rock, Cleveland pig-iron cannot be manufactured, excluding all question of profit, at the price at which foreign pig-iron is being delivered into this country, unless coke of good quality can be delivered to the furnaces at about 27s. per ton. Since it takes nearly a ton and a half of coal to make a ton of metallurgical coke, this would mean than coal would have to be delivered at the coke ovens at a price not exceeding about 20s. a ton.

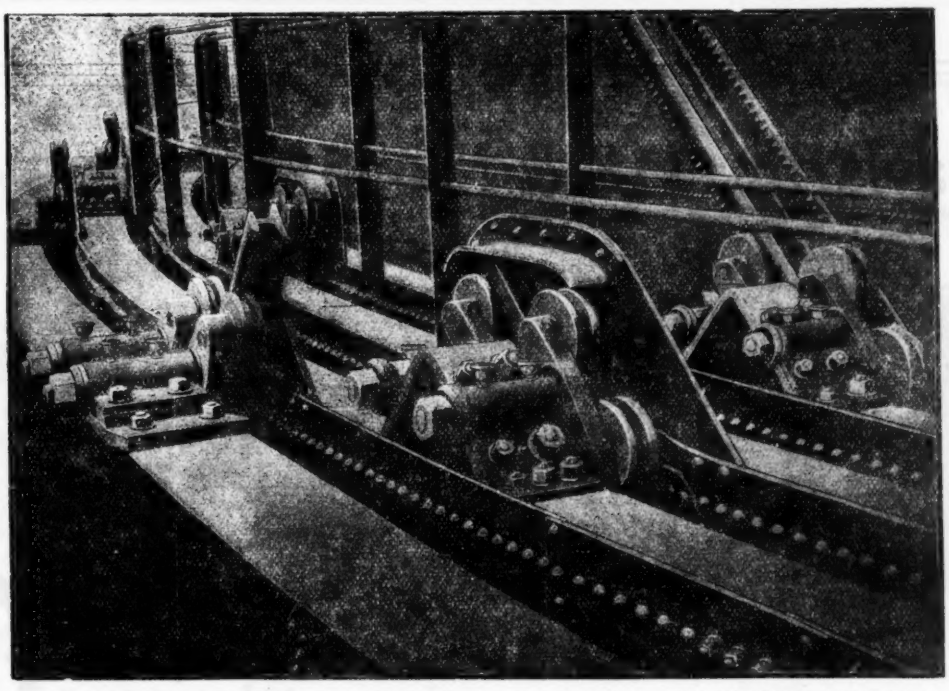
In order to see more clearly how matters stood before the strike, the following comparative figures with regard to coal in the years 1913 and 1920, respectively, may be quoted. They were officially reported to the House of Commons by the Secretary for Mines on March 31:

Average Cost of Producing a Ton of Coal.

	1913. s. d.		1920. s. d.
Wages	6 4	..	25 9½
Timber, stores, and other costs	1 10	..	5 4½
Royalties	0 5½	..	0 7½
	8 7½	..	34 1½
Add owners' profits per ton	1 6	..	2 6½
	Tons.		Tons
Total coal raised at mines	287,412,000	..	229,295,000
Total coal raised per person employed at mines	259	..	190
Amount of coal shipped abroad—			
As cargoes	73,400,118	..	24,931,853
As bunkers	21,031,550	..	13,840,360

The position thus revealed may be summed up as follows: (*a*) The average cost of producing coal at the pithead, excluding owners' profits, had in seven years increased nearly fourfold; while (*b*) the amount raised per person employed had diminished by more than 25 p.ct.; and (*c*) our coal exports to foreign markets (excluding bunkers) had fallen to one-third the pre-war amount. If such staggering figures do not quickly bring the nation to its senses, the position is indeed a hopeless one. Were the miners to resume work to-morrow on the terms originally proposed by the owners, we should still be nowhere near getting coal at 20s. per ton that is needed for the future maintenance and prosperity of our great manufacturing industries. Let it not be forgotten that the central and basic fact of the economic position of our country is that it is not naturally endowed with the capacity to produce in quantities sufficient for the needs of a modern industrial community a great variety of raw materials, nor yet can it grow sufficient food for its present working population. Its industrial system can only be maintained so long as its ships bring abundance of both food and raw materials from all parts of the world to its coal; and without the impelling power of relatively cheap coal, which is the keystone of the whole economic structure, it will neither be able to attract the raw materials, nor yet build or maintain the ships in which to convey them.

The only important raw materials which the country can produce in excess of its requirements are coal, clay, and salt. Half the iron smelted in our furnaces is from imported ores. We have to import the whole of the copper and cotton, more than 90 p.ct. of the lead, zinc, and tin, and about 80 p.ct. of the wool and timber used in our industrial establishments. In addition, we have to feed our working population for at least forty weeks of the year on imported



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MANCHESTER.

foodstuffs. All this means that our country's position depends absolutely the constant free exchange with the outside world of the products of its labour (either past or present) for the food and raw materials which are requisite for its maintenance. Such an immense exchange is only possible with relatively cheap coal and low nominal wages, both of which, it may be remarked, ultimately depend upon cheap food. It is important that neither the public nor the Government should harbour any vain delusions on the matter, but rather that they should take warning ere it is too late. The country is practically devoid of water-power resources; and the amount of oil-fuel available would not suffice for a tithe of its industrial requirements. The alternative to cheap coal is industrial collapse, with consequent "red ruin and the breaking-up of laws."

INDUSTRIAL STANDARDIZATION OF ENGINEERING AND ALLIED PRODUCTS.

A conference (unofficial in character) of the Secretaries of the various standardizing organizations at present in existence was recently held in London—convened with the cordial permission of the Main Committee of the British Engineering Standards Association. The proceedings were opened by the Chairman of the Association, Sir Archibald Denny, Bart.; and the following Secretaries were present: Dr. P. G. Agnew, United States; Mr. A. Eriksen, Norway; Mr. E. Hijmans, Holland; Mr. J. R. Durley, Canada; Mr. Gerard, Belgium; M. Zollinger, Switzerland; and Mr. C. le Maistre, C.B.E., Great Britain.

The object of the conference was the change of ideas looking towards the establishment of closer relationship; and from this point of view it was held to be eminently successful. Each Secretary gave a brief report of the general organization of the work in his own country; the methods adopted in arriving at the standards; and the principles followed to ensure their adoption when issued. It is pointed out that in most countries it is becoming more and more recognized that industrial standardization (whether of quality or dimensions), to be really useful, must be arrived at through a process of unifying the needs of industry rather than by attempting to set up an ideal. It also appears that, whereas engineers are everywhere giving freely of their time and experience to this important work, its value to commerce generally is far too little appreciated, and is therefore not being supported financially to the extent it should be. Some enthusiasts are rather apt to think that the time has arrived to attempt to create an international organization for standardizing all engineering products; but the conference, it is stated, took a much more modest view, and, recognizing the almost insuperable difficulties in the way, preferred to see international standardization develop along national lines and sectionally, similar to those adopted, for instance, by the electrical industry.

The conference having no executive functions whatever, each Secretary will in due course submit to his respective organization the suggestions of the conference on the various points discussed.

Our informant says: The human factor enters so largely into all questions of standardization that for the Secretaries of these important bodies to meet and become personally acquainted, and thus have an opportunity of comparing notes in this informal way, is bound to be of no small advantage in the future, and will materially assist in guiding international intercourse along right lines on this complex question.

The Secretaries were entertained by the British Engineering Standards Association during their four days' conference.

RE-FIXING AND RE-TESTING OF METERS.

During question time, at the meeting of the London County Council on Tuesday of last week, Mr. Edward Cruse asked the Chairman of the Public Control Committee the following questions:

1.—Can meters taken down for any reason whatsoever be re-fixed in a house without being subjected to the Council's test—that is to say, the meter is taken down, no top is taken off or back plate taken out, the seals remain as they were, and only the slot mechanism altered?

2.—May the gas company, or gas-meter companies, decide whether the meter is correct, or should the Council's Stamping Office decide before the meter is again fitted up for a consumer?

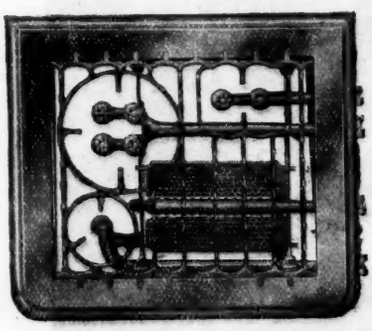
3.—A meter may be one, two, three years or more in use, and may be registering fast or slow, although not defective in any other way. Naturally, it is tested either by the gas company or the gas-meter company; but is this sufficient?

Sir George Bettesworth Piggott, K.B.E., J.P., in reply, said the answer to the first question was in the affirmative. Unless the inspector's seal was broken no fresh test was necessary, as the Statute declared that a stamped meter was to be considered a legal meter throughout the United Kingdom, unless it was found to be incorrect. The prepayment mechanism of a slot meter was not part of the meter proper, and therefore was not subject to examination by the inspector. The dial of the meter recorded the quantity of gas supplied; and the consumer could see that he received the quantity of gas for which he paid.

In answer to the second question, the Council had no power to require a meter that had been taken down from service to be re-tested before being re-fixed on a consumer's premises. But if at any time subsequently the gas company or consumer had reason to doubt the accuracy of the meter, either party could arrange for it to be tested at one of the Council's testing offices.

In answer to No. 3, he presumed the question referred to meters taken down by a gas company, and on examination found to be defective and then set up again without the defect being corrected. He should not be disposed to think that the officials of a gas company

Davis No. 118 & No. 119.



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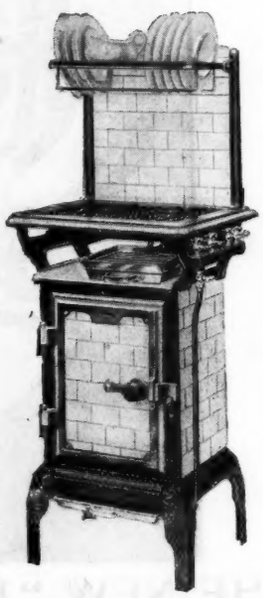
White Enamel, tile - pattern, Back, Sides, and Oven Door.



The Davis No. 118 Cooker, with Stand and Plate Rack.

The Davis Gas Stove Co., Ld.

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would do this. Opinion was divided as to whether it was necessary to set up a check against such a possibility. Some regarded the existing powers of either party in case of dispute as sufficient; others were in favour of a periodical reverification of meters.

Mr. Cruse asked whether the Chairman of the Public Control Committee would have inquiries made to test the accuracy of his statement; and Sir George Piggott promised to report the matter to the Chief Officer to see if there was any truth in it.

DANGER OF VERDIGRIS.

Split Gas-Pendant Causes Fatality.

A distressing fatality arising out of the join in a kitchen gas-pendant splitting open during the night has occurred at Tooting; a girl named Violet Lilian Austin, 16 years of age, being asphyxiated as she slept in the room immediately above the kitchen. The circumstances were investigated by Mr. INGLEBY ODDIE (Coroner for Wandsworth), when Mr. GOSDEN appeared for the Wandsworth, Wimbledon, and Epsom Gas Company, and Mr. ROSS represented Messrs. Falk, Stadelmann, & Co., of Farringdon Road, from whom the gas-fittings had been purchased.

Mr. *Herbert J. Austin*, of Longley Road, Tooting, stated that deceased was his daughter, and lived with him. She enjoyed splendid health, and they had been in the house for six years. Witness had purchased gas-fittings from Messrs. Falk, Stadelmann, & Co., among them being the pendant for the kitchen, which had a ball-and-socket joint at the top. Some years ago there was a slight smell of gas at the top; and he had stopped the leak with putty or white lead. Since then there had been no escape. One morning witness knocked on the wall of his daughter's room, and received no answer. He got out of bed, and opened her door to find the room full of gas. The tap at the bracket was turned off. A police sergeant noticed a split down the pendant. There was no smell before they went to bed.

Thomas Nightingale, a gas-fitter, said he had examined the pipe, and found a split some 18 in. long down the pendant. The split, in his opinion, was caused by the verdigris eating into the stem.

The CORONER: How are we to protect ourselves from this?

Witness: By keeping the pendant clean with a paraffin rag, and rubbing on a little grease afterwards.

Mr. *Cyril Murton Croft*, Chief Engineer to the Wandsworth, Wimbledom, and Epsom Gas Company, stated, in reply to the CORONER, who asked what was the usual proportion of water gas in normal times, that they never went beyond 20 p.ct., but owing to the coal strike, they had instructions from the Government to use all their water-gas plant. In regard to the split in the pipe, witness said one would hardly expect a tube to split all down as in this case. It seemed as though the verdigris had some chemical action on the pipe.

The CORONER observed that it was a most deplorable fatality. No blame could be attached to the Gas Company or to Messrs. Falk, Stadelmann, & Co. It seemed as though verdigris had attacked the join in the pipe; and one moral to be drawn from the tragedy was that it behoved everybody to see that gas-pipes did not become covered with verdigris. The medical evidence showed that death was due to asphyxia from coal-gas poisoning; and a verdict in accordance with the evidence was returned.

TRADE NOTES.

[For "Journal" Advertisers.]

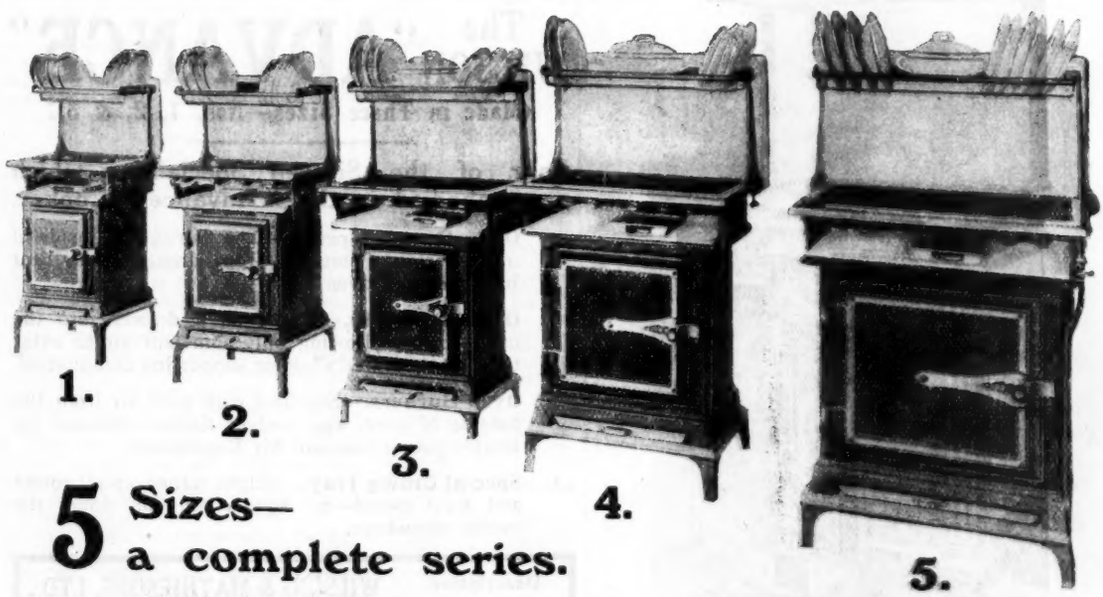
Davis Cookers.

The new season's cooker booklet of the Davis Gas-Stove Company, Ltd., illustrates and describes, among the firm's many popular manufactures, the new "Efficiency" hot-plate, which is being fitted to several patterns of cookers. This hot-plate is fitted with boiling-burners of an entirely new type, for which a remarkable efficiency is claimed, due principally to the Venturi-form shape of the throat of the mixing-tube, in which the mixture of the gas with air is more complete than is the case with ordinary burners, and which produces a much more highly aërated flame than other types of mixing-chamber. The distribution of the flame over the heating surface of the vessel, also, is exceptionally wide and even. The burner consists of one, two, or more heads; each head consuming approximately 4 c.ft. of 500 B.Th.U. gas per hour.

Ellesmere Gas-Works to Close-Down.—It was reported to a meeting of the Ellesmere Urban Council last week that, with the class of coal they were using at the gas-works, they were able to make but very little gas, and had had it quite shut-off for a few days. Mr. Cooke said there seemed nothing to do but to close the gas works, and dispose of the coal for burning in open fires. He felt inclined to leave the matter in the hands of the Manager, and let him do what he thought best. It was stated that they had about 50 tons of coal, and 15 tons of slack. It was eventually decided to close the works, and dispose of the coal as suggested.

Yeovil Corporation Gas Accounts.—The appointment by the Yeovil Corporation Gas Committee of Mr. W. J. Imbrie, of Banbury, as Manager arose through the disappearance of the late Manager, following the transfer of the accounts of the works to the Borough Treasurer's office. In a report to the Town Council, the Committee state that the preliminary report of the investigators confirmed the Borough Treasurer's figures as to the sum unaccounted for—£576. The investigators were satisfied that defalcations occurred within the last financial year, and took place since the last audit. When the books were handed in, the Manager disappeared; and it was now ascertained that he had given I.O.U.'s for £156, and overdrawn on wages £420 odd. If he wanted £150 for wages, he made out a cheque for £180. The loss of £576 odd would fall on the consumers of gas.

Richmond's "Bungalow" Cookers



5 Sizes— a complete series.

Stand with white enamelled top. Oven double cased, packed and enamelled; exterior sides and back green enamel. Patent plate rack. High efficiency burners. Gas and air regulators.

"They Head the Cooker Sales."

The Richmond Gas Stove & Meter Co., Ltd., Warrington & 164-172, Queen Victoria Street, London, E.C. 4.

CURRENT SALES OF GAS PRODUCTS.

Tar Products in the Provinces.

May 17.

In pitch there seems to be a little more inquiry, and some transactions have been reported. There is also a little more inquiry for solvent naphtha.

The average values for gas-works products during the week were: Gas-works coal tar, 49s. to 54s. Pitch, East Coast, 60s. to 62s. 6d.; West Coast—Manchester, 57s. 6d. to 60s.; Liverpool. 57s. 6d. to 60s.; Clyde, 60s. to 62s. 6d. Benzole 90 p.ct. North, 2s. 10d. to 3s.; crude 65 p.ct. at 120° C., 2s. 3d. to 2s. 5d. naked at makers' works; 50-90 p.ct. naked, North, 2s. 11d. to 3s. 1d. Toluol, naked, North, 3s. to 3s. 1½d. nominal. Coal tar crude naphtha in bulk, North, 11½d. to 1s. Solvent naphtha, naked, North, 2s. 3d. to 2s. 4d. Heavy naphtha, North, 2s. 9d. to 3s. Creosote, in bulk, North, liquid, 8½d. to 8¾d.; salty, 8d. to 8¼d. Heavy oils, in bulk, North, 10½d. to 11½d. Carbolic acid, 60 p.ct., 1s. 8d. to 1s. 10d. Naphthalene, £20 to £30; salts, £7 to £9, bags included. Anthracene, "A" quality, 10d. to 1s. per minimum 40 p.ct.; "B" quality, nominal.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *May 17.*

The London tar products market continues in a stagnant condition; the lengthened duration of the coal strike adding to the general depression. Apart from road tar, the volume of business done is nominal in amount. Current values are: Pure benzole and pure toluol, about 3s. 3d. per gallon; solvent naphtha, 95-160, 2s. 6d. to 2s. 9d. per gallon; creosote, 9d. to 9½d. per gallon. There are a few belated inquiries for pitch for prompt delivery, and buyers are now expressing some interest in next season's delivery. But their ideas of price at present are below those of makers.

In sulphate of ammonia there is nothing fresh to report.

FROM A MARKET CORRESPONDENT.

Tar Products.

There has not been much activity in this market since our last report; but there is some tendency for prices to harden owing to the reduction of stocks consequent on the continued coal strike. Many of the tar-distilling works have closed down on account of shortness of fuel. With the approach of the end of the season, the demand for pitch is falling off; prices ranging between 60s. and 70s. per ton. Naphthalenes are quite inactive; crudes ranging from £8 to £12, and refined from £17 10s. to £22 10s. Solvent naphtha is rather more difficult to find than a week ago, and is worth possibly 2s. per gallon. Heavy naphtha is about 2s. 3d. Carbolic acid is as dead as ever; and there is no activity in cresylic acid, although the price is slightly dearer on account of shortage of fuel. Creosote is also dearer, and is worth 8½d. to 9d. per gallon. There has been rather more business in intermediates, although stocks in most cases are very low. Aniline oil and salts have been in continued request for export at 1s. 8d. and 1s. 10d. per lb. respectively. Salicylic acid remains at 1s. 3d. per lb. for technical grade. Resorcin is not much asked for, and the price is rather cheaper at 7s. 9d. per lb.

Sulphate of Ammonia.

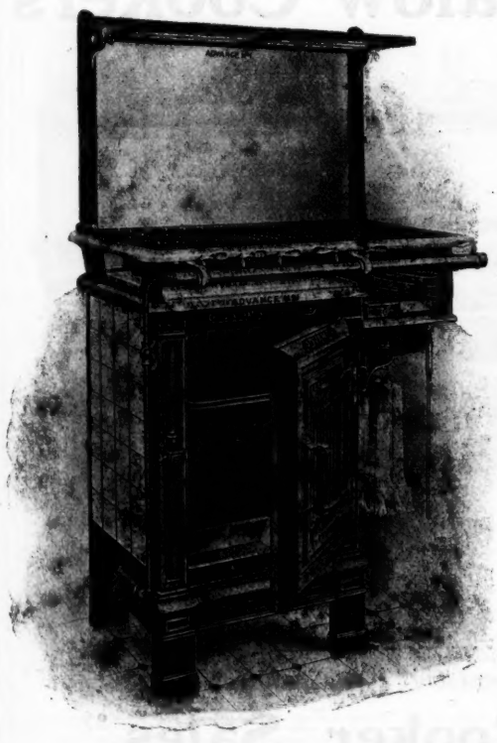
There is absolutely nothing fresh to report. Prices for home consumption remain at £24 11s. until the end of the current month. Export prices are £15 to £17 per ton. There is talk of a considerable cut in prices for home consumption after the end of the month. In some quarters a reduction by £10 per ton is being looked for.

Restrictions at St. Blazey.—The St. Blazey Gas Company, Cornwall, have restricted the consumers to five hours and a half of gas daily, except on Sundays, Tuesdays, and Thursdays, when an extra two hours at midday are to be allowed.

Gas Curtailment in Glasgow.—The Glasgow Corporation are greatly feeling the effects of the coal strike, and were obliged to intimate to the consumers that, as from the beginning of this week, the supply would be available for only five-and-a-half hours out of the twenty-four. All street lighting is stopped.

Success of the Cleckheaton Gas-Works.—On "Budget" day of the Spenborough District Council last week, criticisms from certain quarters in the days when Spenborough was being created by the amalgamation of Cleckheaton, Liversedge, and Gomersal, were answered by the success of the gas-works at Cleckheaton. The opposition to the amalgamation some few years ago described the Cleckheaton Gas-Works as a "white elephant" which the Cleckheaton people wanted the others to share. It was pointed out last week that the combined townships had actually benefited by grants-in-aid from the Cleckheaton Gas-Works of amounts of £500, £1000, £4200, and £2700.

Gas-Works Results at Richmond (Yorks.).—At the quarterly meeting of the Richmond (Yorks.) Corporation, it was stated that the gas-works had not been able to make a contribution this half year to alleviate rates. It was reported that for the three months ended April last, 6,308,000 c.ft. of gas was generated, as compared with 6,401,000 c.ft. during the corresponding period last year. The reduction largely occurred in April, because of the call for reduced consumption. Last year, 11,670 c.ft. of gas was obtained per ton of coal, as against 11,446 c.ft. this year. Mr. Morton said the undertaking was not in a very good position just now. Much less had been realized on coke, coal had cost more, wages had risen very considerably, and now they had great difficulty in getting any coal at all.



Cooker De Luxe.

The WILSON "ADVANCE"

(Made in Three Sizes—Nos. 1, 2, & 3).

Four of the Sixteen Specialities which are embodied in the "Advance" Cooker.

9. **Oven Draught-proof.**—The flames and inside of oven perfectly shielded from draughts—no heat blown out of oven.
10. **Oven Drip Tin.**—Slides as a drawer into the oven bottom allowing only sufficient air to enter through measured slots for supporting combustion.
11. **Oven Burners.**—Supplied with pure air from the outside of oven, and perfect flames obtained by Bray's patent Gas and Air Regulators.
12. **Special Crown Tray.**—Edges turned up all round and front raised—no liquids can run down the cooker anywhere.

Descriptive Leaflets and Prices on Application to Manufacturers.

WILSONS & MATHIESONS, LTD.,
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ARMLEY, LEEDS.

London Showrooms:
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CHEAPSIDE, E.C.

Gas-Works Shut-Down.—The gas supply at Seaham Harbour ceased last Wednesday at midnight, on account of the Gas Company being unable to secure further supplies of coal. This has entailed the closing-down of the Seaham Iron Foundry, the power for which is derived from gas. In Scotland several gas-works, like those at Girvan, have ceased operations.

Gas-Fire Guards for Children.—While hearing, in the Shoreditch County Court, a case in which a man sued a publican for £3 15s., the value of an overcoat which caught fire from a gas-stove having, as plaintiff argued, no guard in front of it, Judge Cluer said guards were for children and not for adults. So far from the absence of a guard being negligence, the plaintiff saw the fire without a guard, and the negligence was on his part in going near it. Plaintiff said the publican had admitted he was liable, but thought 10s. quite enough for the damage. Judge Cluer: As he has admitted liability himself, I will give you judgment for £3; but I certainly should not have found against him if he had come and denied negligence and liability.

Finances at Carlisle.—The Gas Committee of the Carlisle Corporation have had under consideration a report of the Engineer (Mr. J. E. Blundell) with regard to the revenue expected to be derived from the sale of gas in the current financial year. To avoid a deficit at the end of next year, he recommended the Council to increase the price of gas by 6d. per 1000 c.ft. The Committee decided to defer coming to a decision until a future meeting.

Cost of Gas at Shotley Bridge.—It was stated by the Clerk at the last meeting of the Leadgate Urban District Council that a protest had been entered by the Urban District Councils of Consett, Benfieldside, and Leadgate against the proposed greatly increased charges of the Shotley Bridge and Consett District Gas Company. He had just received a letter from the Board of Trade stating that they were advised that an increased price of 6s. 9d. per 1000 c.ft. would not be more than sufficient to enable the Company to pay a dividend of 3⅜ p.c.t. per annum upon their ordinary capital, and that therefore the Board had made an Order accordingly.

STOCK MARKET REPORT.

THE general tone of things on the Stock Exchange oscillated a good bit, with short and frequent changes from dulness to partial recovery. The coal question was, of course, the chief, but not the only, depressing factor. The looked-for lower Bank rate did not materialize. Business was only at half-speed—caution as to commitments being impressive; and, with the Whitsun interval imminent, the close became very quiet.

In the gilt-edged market, Home Government issues had ups and downs, but final prices on Friday for the big four were almost unchanged—viz., Consols 46⅜-47⅜, War Loan 87⅝-87⅞, Funding 71¼-71⅝, Victory 79⅛-79⅜. Indians were in good request. Home rails fluctuated, but did not change much. Canadians were fair; but Argentines weakened.

The Foreign Market showed some strength; French, Belgian, Mexican, and Chinese being prominently to the front.

The Miscellaneous Market was a sufferer, and general dulness prevailed.

The Gas Market had the brightest week it has had for an almost incalculable period. The renascence began on Monday, and prices pretty well all throughout the list were put up freely, as is more particularly shown in our "Present Prices" column. In this respect, the London and the Suburban companies which have already received their Board of Trade Orders under the Gas Regulation Act are prominent.

Bargains done for cash during the week were as follows: On Monday, Bournemouth 5 p.ct. 7⅞, 7⅛, Brentford "A" 61⅝, 61¾, European 7⅛, Gas Light ordinary 54½, 55½, ditto maximum 41½, 42, Imperial Continental 148, 148½ 149½ (and "exceptional" 125, 150, 156½), Oriental 91⅛, South Metropolitan 64½, 64⅝, 65, 65½, Southampton 57. On Tuesday, Brentford "B" 61, 61½, 62, Brighton and Hove original 98, 98½, Commercial 3½ p.ct. 50, Gas Light ordinary 55½, 56, Imperial Continental 147½, 148, 149 (and exceptional 125, 137½, 143⅜, 148½, 150), South Metropolitan debenture 48, Toronto Consumers 137. On Wednesday, Bournemouth 5 p.ct 7⅝, 7¾ Gas Light ordinary 55, 55⅝, 55¾, 55⅝, 56, 56¼, ditto preference 58, Imperial Continental 148, 149 (and exceptional 137½), San Paulo debenture 36, Croydon 5 p.ct. maximum "D" 64. On Thursday, Bournemouth debenture 55, Brighton and Hove original 98½, Commercial 3½ p.ct. 51, Gas Light ordinary 55½, 55¾, 55⅞, 56, 56½, ditto maximum 44, 44½, 45, ditto debenture 49½, Imperial Continental 147½ (and exceptional 125, 143¾, 149). On Friday, Alliance and Dublin 41⅛, 42⅛, Brighton and Hove ordinary 66, European 7⅛, 7⅛, 7⅞, Gas Light ordinary 56, 56½, 56⅝, 56¼, ditto debenture 50, Imperial Continental 147½, 147⅞, 149, 150 (and exceptional 125, 137½), Monte Video 63, Primitiva 9s. 9d., ditto preference 27s., 27s. 6d., San Paulo preference 5⅛, 5⅜, South Metropolitan 64½, 66, 67, South Suburban debentures 72, Brighton and Hove 5 p.ct. debenture 74⅛.

In the Money Market, the situation during the earlier portion of the week was extremely easy; but thenceforward rates hardened in response to demand. Supplies, however, were adequate to meet it. Silver responded to a restricted demand by falling from 35½d. to 33⅝d. The Bank rate is 6½ p.ct., as fixed on April 28.

The Ministry of Health have sanctioned the borrowing by the Plymouth Corporation of £21,000 for the purchase of gas stoves, meters, automatic installations, circulators, and fires, to be repaid within ten years.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAMe.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Mar. 11	4	4%	Aldershot 4 p.c. Pref.	...	53—58	...
1,551,868	,,	Apl. 14	2½	3⅛%	Alliance & Dublin Ord.	59—64	39—44	41¼—42½
374,000	,,	Jan. 13	4	4%	Do. 4 p.c. Deb.	76—79	47—52	...
280,000	5	Oct. 28	7½	8%	Bombay, Ltd.	5¼—6½	4—4½	...
100,000	5	Feb. 25	16	5%	Bournemouth Gas & Water: 5 p.c.	...	7—8	7 7/16—7⅞
383,110	10	,,	7	7%	Bournemouth Gas & Water: B 7 p.c.	15—15½	8½—9½	...
115,000	10	,,	6	6/-	Bournemouth Gas & Water: Pref. 6 p.c.	13½—14	7⅞—8½	...
162,065	—	Dec. 30	—	4%	Bournemouth Gas & Water: 4 p.c. Deb.	...	55—60	55
992,045	Stk.	Feb. 25	14	30/-	Brentford A Consolid.	261—266	62—67	61⅛—61½
734,920	,,	,,	11	26/3	Do. B New	204—209	58—63	61—62
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	68—73	...
221,400	,,	Dec. 15	4	4%	Do. 4 p.c. Deb.	91—93	57—59	...
214,775	,,	Mar. 11	11	7½%	Brighton & Hove Orig.	208—213	95—105	98—98½
244,200	,,	,,	8	5⅜%	Do. A Ord. Stk.	154—159	65—75	66
1,287,500	Stk.	July 29	5	5%	Bristol 5 p.c. max.	...	...	...
530,000	20	Mar. 30	12½	10%	British	44—45	22—24	...
120,000	Stk.	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	88—90	50—55	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	37—40	...
100,000	10	May 27	—	—	Cape Town & Dis., Ltd.	1½—2½	7—7½	...
100,000	10	Apl. 28	—	4½%	Do. 4½ p.c. Pref.	4—6	4½—5½	...
100,000	Stk.	Dec. 30	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	55—60	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	...	...
1,513,280	,,	Feb. 25	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	50—53	...
560,000	,,	,,	5½	26/3	Do. 3½ p.c. do.	103—105	47—52	50—51
475,000	,,	Dec. 15	3	3%	Do. 5 p.c. Deb. Stk.	69½—71½	42—45	...
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	20—25	...
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	30—40	...
51,600	,,	Feb. 5	15	10%	Croydon A 10 p.c.	...	120—130	...
278,400	—	,,	12	7%	Croydon B and C 7 p.c.	...	95—105	...
492,270	Stk.	—	6	4⅛%	Derby Con. Stk.	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	6½—7½	7½—7⅝
16,298,975	Stk.	Feb. 10	4/17/4	30/-	Gas, Light and Coke: 4 p.c. Ord.	98—102	55—57	54⅜—56½
2,600,000	,,	,,	3½	26/3	Gas, Light and Coke: 3½ p.c. max.	76—79	42—45	47½—45
4,062,235	,,	,,	4	4%	Gas, Light and Coke: 4 p.c. Con. Pref.	96—99	56—59	58
4,674,850	,,	Dec. 15	3	3%	Gas, Light and Coke: 3 p.c. Con. Deb.	72½—74½	48—51	49½—50
130,000	,,	Dec. 11	10	10%	Gas, Light and Coke: 10 p.c. Bonds.	...	...	...
82,500	,,	Mar. 11	5	3⅛%	Hastings & St. L. 5 p.c.	...	48—53	...
258,740	,,	,,	3½	2⅛%	Do. 3½ p.c.	87—89	34—39	...
70,000	10	May 12	11	5%†	Hongkong & China, Ltd.	16½—16¾	7—8*	...
86,600	Stk.	Mar. 11	9	5⅛%	Hornsey 7 p.c.	...	75—85	...
131,000	,,	Mar. 30	7½	3⅛%	Ilford A and C	151—154	76—81	...
63,780	,,	,,	6½	2⅛%	Do. B	115—118	55—60	...
65,500	,,	Dec. 30	4	4%	Do. 4 p.c. Deb.	92—94	54—56	...
1,976,000	,,	,,	9	5%†	Imperial Continental	150—160	147—152	147½—150
1,235,000	,,	Feb. 10	3½	3⅛%	Do. 3½ p.c. Deb. Red.	84—86	75—80	...
235,242	,,	Mar 30	6½	3⅛%	Lea Bridge Ord. 5 p.c.	119—121	62—67	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. A. / B.	211—213 / 146—148	... / ...	... / ...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,716	,,	Feb. 25	7/5/6	3⅛%	Maidstone 5 p.c.	...	52—57	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4½—4¾	1⅝—2½	...
250,000	100	Apl. 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	88—93	...
541,920	Stk.	Nov. 26	4	6%	Monte Video, Ltd.	11½—12	60—70	63
1,875,892	,,	Feb. 25	4½	3⅛%	Newcastle & Gatsh'dCon.	98½—99½	57—59	...
529,705	,,	Dec. 30	3½	3⅛%	Do. 3½ p.c. Deb.	82—83	50—51	...
15,000	10	Mar. 11	—	8%	North Middlesex 10 p.c.	...	12½—13	...
53,940	10	,,	7/14/0	5⅛%	,, ,, 7 p.c.	14—15	7½—7⅞	...
300,000	Stk.	May 12	8	8%	Oriental, Ltd.	117—122	87—92*	...
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅞	2—3	...
60,000	50	Feb. 25	13	7½%	Portsea Island, B	128—131	65—70	...
100,000	50	,,	12	6¾%	Do. C	118—121	50—55	...
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	1—1	9/9
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4½—5	1⅛—1½	27/—27/6
521,600	100	Dec. 1	4	4%	Do. 4 p.c. Deb.	91—93	67—69	...
600,000	Stk.	Jan. 27	4	4%	Do. ,, ,, 1911	...	37—40	...
346,198	,,	Dec. 30	4	4%	River Plate 4 p.c. Deb.	85—87	37—40	...
150,000	10	Mar. 30	6	6/-	San Paulo: 6 p.c. Pref.	10½—11	5½—6½	5⅜—5⅝
125,000	50	Jan. 3	5	5%	San Paulo: 5 p.c. Deb.	47—49	35—40	36
135,000	Stk.	Mar. 30	10	5%	Sheffield A	223—224	62—64	...
209,984	,,	,,	10	4⅛%	Do. B	222—224	62—64	...
523,500	,,	,,	10	3⅛%	Do. C	220—222	60—62	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	...	...	...
90,000	10	Sept. 30	9	9%	South African	10½—11½	10½—11½	...
6,609,895	Stk.	Feb. 10	5/4/0	5%	South Met. Ord.	111—113	65—67	64½—67
250,000	,,	Jan. 13	—	5%	Do. Red. Pref.	...	90—92	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	46—49	48
224,820	,,	Feb. 25	8½	7½%	South Shields Con. Stk.	157—159	85—87	...
1,087,795	,,	,,	6	3⅛%	S'th Suburb'n Ord. 5 p.c.	114—116	58—63	...
368,837	,,	Dec. 30	5	5%	Do. 5 p.c. Deb. Stk.	116—118	72—77	72
647,740	,,	May 12	7½	3⅛%	Southampton Ord.	99—102	55—58*	57
121,275	,,	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	...	57—59	...
120,000	,,	Feb. 25	—	3⅛%	Tottenham & District: A 5 p.c.	135—138	57—62	...
782,275	,,	,,	6	2⅛%	Tottenham & District: B 3½ p.c.	115—117	50—55	...
181,255	,,	Dec. 15	4	4%	Tottenham & District: 4 p.c. Deb.	87—89	53—56	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Feb. 25	5	3⅛%	Tynemouth 3 p.c. max.	108½—109	68—70	...
					Wandsworth, Wimbledon, and Epsom—			...
30,000	,,	Feb. 25	8½	47/6	Wandsworth A 5 p.c.	151—156	78—83	...
255,636	,,	,,	6½	32/6	Do. B 3½ p.c.	129—134	55—60	...
108,075	,,	,,	—	33/3	Do. C	...	52—57	...
140,865	,,	,,	—	33/3	New Ordinary	...	52—57	...
352,000	,,	,,	6½	26/3	Wimbledon 5 p.c.	117—122	46—51	...
98,000	,,	,,	6½	32/6	Epsom 5 p.c.	121—126	52—57	...
88,416	,,	Dec. 30	3	3%	3 p.c. Deb. Stk.	66—69	40—43	...

* Ex Div. † Next dividend will be at this rate.

Road Tarring Complaints.—The Automobile Association and Motor Union has lately received a number of complaints that many roads after tarring are gritted with material which is not only injurious to pneumatic tyres, but gets thrown-up and adheres to the body of the car. It is generally agreed that fine sand is the best covering to use after tarring; but the Union states that some councils use shingle and sand, and others pea gravel or sharp shingle mixed with sand. The Union asks surveyors generally to co-operate by using more finely-crushed material where sand is not available.

Primitiva Gas Company of Buenos Ayres.—At the twentieth annual meeting next Tuesday, the Directors will report a total loss for the year ended Dec. 31 of £95,510, to which has to be added the debit balance of profit and loss account at the end of 1919 of £367,167, making the total debit to this account £462,677. A strike at all the Company's works broke out on Nov. 1, and the men remained out until March 14 of this year. The cost of coal during the year under review was very high, none being obtainable from this country. Supplies had to be purchased in the United States, often of poor quality, and at extravagant prices. Very heavy sums were paid for demurrage claims on steamers, in consequence of the port workmen having boycotted the Company, to help the men on strike. The price of water-gas oil was absolutely prohibitive. Capital expenditure has again been reduced to a minimum. The network of mains at Dec. 31 was 1135 miles. The Company's works have been maintained in efficient order out of revenue. It has not been possible to make any provision for the retiro amortization. Under clause 5 of the contract with the Municipality of Buenos Ayres, dated Jan. 10, 1920, it is stipulated that within two years the Executive Department, by mutual agreement with the Company, shall fix the amount of the capital of the Company to serve as a basis for the amortization of same in case the Municipality decide to take over the plant and stock of the Company. This agreement must be concluded before Jan. 10, 1922.

A repeat order has been received from the Bathgate (N.B.) Gas Company for the duplication of their Tully plant; and an order has been given for a plant for Reus, Spain.

The issue of 7½ p.ct. redeemable preference stock in the Croydon Gas Company, recently made by Messrs. A. & W. Richards, was considerably over-subscribed; the applications for the £120,000 offered amounting to over £157,000.

The Inverness Town Council have increased the salary of their Gas Manager, Mr. A. Thomson, to £600 per annum. It was stated at the last meeting that the installation of vertical retorts has proved an unqualified success, and that the gas-works have reached a high state of efficiency.

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